Colorado River Interim Surplus Criteria

Final Environmental Impact Statement

Executive Summary

U.S. Department of the Interior
Bureau of Reclamation
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EXECUTIVE SUMMARY

COLORADO RIVER INTERIM SURPLUS CRITERIA FINAL ENVIRONMENTAL IMPACT STATEMENT

S.1 INTRODUCTION AND BACKGROUND

S.1.1 INTRODUCTION

The Secretary of the United States Department of the Interior (Secretary), acting through the United States Bureau of Reclamation (Reclamation), is considering the adoption of specific interim criteria under which surplus water conditions may be declared in the lower Colorado River Basin (see Map S-1) during a 15-year period that would extend through 2016.

The Secretary is vested with the responsibility of managing the mainstream waters of the lower Colorado River pursuant to applicable federal law. This responsibility is carried out consistent with a collection of documents known as the *Law of the River*, which includes a combination of federal and state statutes, interstate compacts, court decisions and decrees, an international treaty, contracts with the Secretary, operating criteria, regulations and administrative decisions.

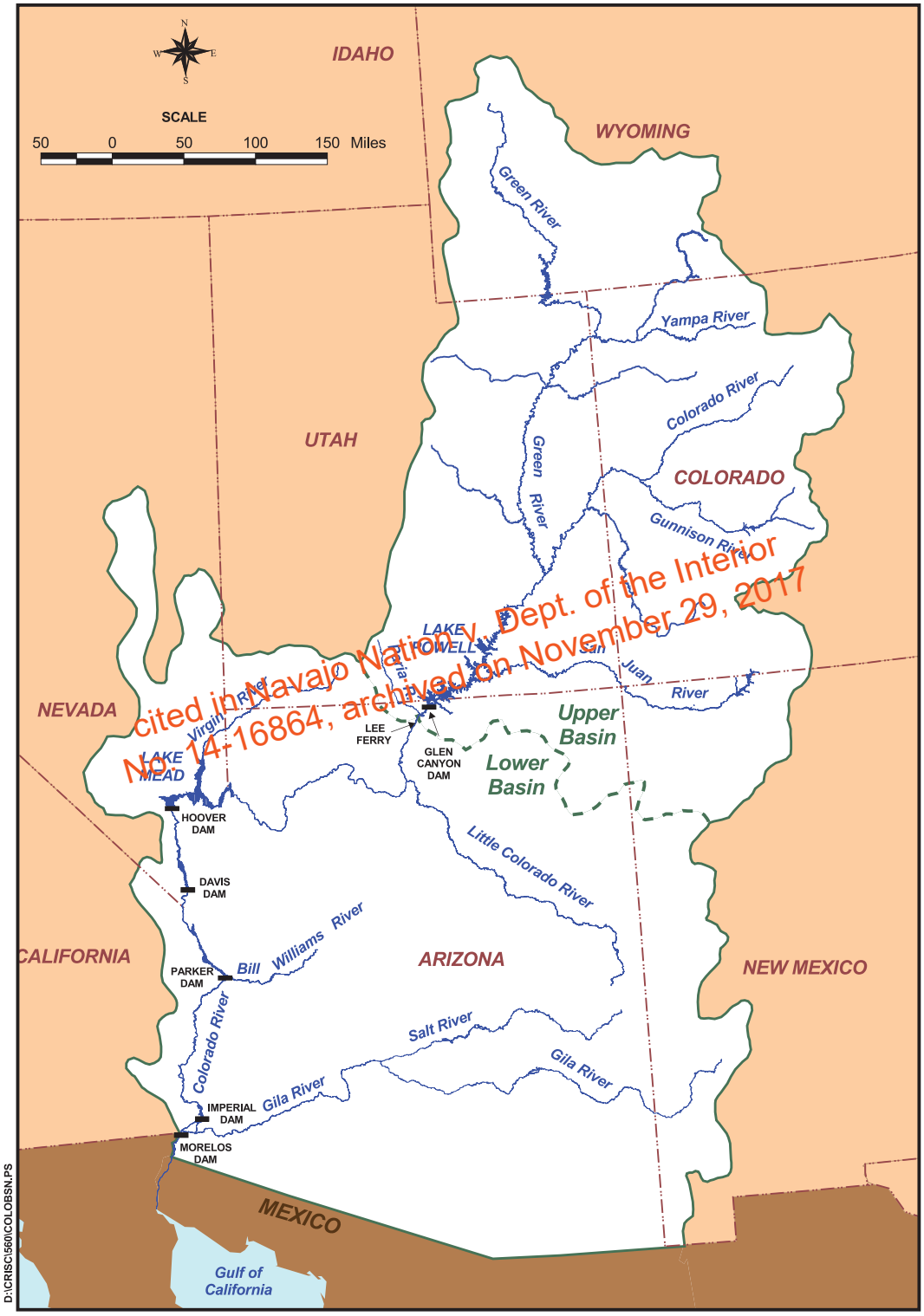
The long-term Colorado River system management objectives are to:

- Minimize flood damages from river flows;
- Release water only in accordance with the 1964 Decree in *Arizona v. California* (Decree);
- Protect and enhance the environmental resources of the basin;
- Provide reliable delivery of water for beneficial consumptive use;
- Increase flexibility of water deliveries under a complex allocation system;
- Encourage efficient use of renewable water supplies;
- Minimize curtailment to users who depend on such supplies; and
- Consider power generation needs.

As the agency that is designated to act on the Secretary's behalf with respect to these matters, Reclamation is the Lead Federal Agency for the purposes of National Environmental Policy Act of 1969 (NEPA) compliance for the development and implementation of the proposed interim surplus criteria. The National Park Service (NPS) and the United States Section of the International Boundary and Water

Commission (USIBWC) are cooperating agencies for purposes of assisting with the environmental analysis.

Map S-1 Colorado River Drainage Basin



A Final Environmental Impact Statement (FEIS), of which this document is a summary, has been prepared pursuant to NEPA, as amended, and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508). The FEIS has been prepared to address the formulation and evaluation of specific interim surplus criteria and to identify the potential environmental effects of implementing such criteria.

The FEIS addresses the environmental issues associated with, and analyzes the environmental consequences of, various alternatives for specific interim surplus criteria. The alternatives addressed in the FEIS are those Reclamation has determined would meet the purpose and need for the federal action and represent a broad range of the most reasonable alternatives.

In addition to this Summary, the FEIS contains three separate volumes. *Volume I* describes the proposed action, the alternatives considered, the analysis of potential effects of interim surplus criteria on Colorado River operation and associated resources, and environmental commitments associated with the action alternatives. *Volume II* contains attachments that are comprised of documents and other supporting material that provide detailed historical background and/or technical information concerning this proposed action. *Volume III* contains reproductions of comment letters from the public resulting from the public review of the Draft Environmental Impact Statement (DEIS) and Reclamation's responses to the comments received.

S.1.2 PROPOSED FEDERAL ACTION

The proposed federal action is the adoption of specific interim surplus criteria pursuant to Article III(3)(b) of the *Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968* (Long-Range Operating Criteria [LROC]). The interim surplus criteria would be used annually to determine the conditions under which the Secretary may declare the availability of surplus water for use within the states of Arizona, California and Nevada. The criteria must be consistent with both the Decree entered by the United States Supreme Court in 1964 in the case of *Arizona v. California* and the LROC. The interim surplus criteria would remain in effect for determinations made through calendar year 2015 regarding the availability of surplus water through calendar year 2016, subject to five-year reviews conducted concurrently with LROC reviews, and would be applied each year as part of the Annual Operating Plan (AOP).

S.1.3 BACKGROUND

Pursuant to Article II(B)2 of the Decree, if there exists sufficient water available in a single year for pumping or release from Lake Mead to satisfy annual consumptive use in the states of California, Nevada and Arizona in excess of 7.5 million acre-feet (maf), such water may be determined by the Secretary to be available as surplus water. The Secretary is authorized to determine the conditions upon which such water may be made available. The Colorado River Basin Project Act of 1968 (CRBPA) directs the

Secretary to adopt criteria for coordinated long-range operation of reservoirs on the Colorado River in order to comply with and carry out the provisions of the Colorado River Compact of 1922 (Compact), the Colorado River Storage Project Act of 1956 (CRSPA), the Boulder Canyon Project Act of 1928 (BCPA) and the United States-Mexico Water Treaty of 1944 (Treaty). These criteria are the LROC, discussed further below. The Secretary sponsors a formal review of the LROC every five years.

The LROC provide that the Secretary will determine the extent to which the reasonable consumptive use requirements of mainstream users in Arizona, California and Nevada (the Lower Division states) can be met. The LROC define a *normal year* as a year in which annual pumping and release from Lake Mead will be sufficient to satisfy 7.5 maf of consumptive use in accordance with the Decree. A *surplus year* is defined as a year in which water in quantities greater than normal (i.e., greater than 7.5 maf) is available for pumping or release from Lake Mead pursuant to Article II(B)2 of the Decree after consideration of relevant factors, including the factors listed in the LROC. Surplus water is available to agencies which have contracted with the Secretary for delivery of surplus water, for use when their water demand exceeds their basic entitlement, and when the excess demand cannot be met within the basic apportionment of their state. Water apportioned to, but unused by one or more Lower Division states can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division states as provided in Article II(B)(6) of the Decree.

Pursuant to the CRBPA, the LROC are utilized by the Secretary, on an annual basis, to make determinations with respect to the projected plan of operations of the storage reservoirs in the Colorado River Basin. The AOP is prepared by Reclamation, acting on behalf of the Secretary, in consultation with representatives of the Colorado River Basin states (Basin States) and other parties, as required by federal law. The interim surplus criteria would serve to implement the provisions of Article III(3)(b) of the LROC on an annual basis in the determinations made by the Secretary as part of the AOP process.

S.1.3.1 LONG-RANGE OPERATING CRITERIA

The CRBPA required the Secretary to adopt operating criteria for the Colorado River by January 1, 1970. The LROC, adopted in 1970, control the operation of the Colorado River reservoirs in compliance with requirements set forth in the Compact, the CRSPA, the BCPA, the Treaty and other applicable federal laws. Under the LROC, the Secretary makes annual determinations in the AOP (discussed in the following section) regarding the availability of Colorado River water for deliveries to the Lower Division states (Arizona, California and Nevada). A requirement to equalize the active storage between Lake Powell and Lake Mead when there is sufficient storage in the Upper Basin is also included in Section 602(a) of the LROC, as required by the CRBPA.

Section 602 of the CRBPA, as amended, provides that the LROC can only be modified after correspondence with the governors of the seven Basin States and appropriate consultation with such state representatives as each governor may designate. The LROC call for formal reviews at least every five years. The reviews are conducted as a

public involvement process and are attended by representatives of federal agencies, the seven Basin States, Indian Tribes, the general public including representatives of the academic and scientific communities, environmental organizations, the recreation industry and contractors for the purchase of federal power produced at Glen Canyon Dam. Past reviews have not resulted in any changes to the criteria.

S.1.3.2 ANNUAL OPERATING PLAN

The CRBPA requires preparation of an AOP for the Colorado River reservoirs that guides the operation of the system for the water year. The AOP describes how Reclamation will manage the reservoirs over a 12-month period, consistent with the LROC and the Decree. The AOP is prepared annually by Reclamation in cooperation with the Basin States, other federal agencies, Indian Tribes, state and local agencies and the general public, including governmental interests as required by federal law.

As part of the AOP process, the Secretary makes annual determinations regarding the availability of Colorado River water for deliveries to the Lower Division states as described below. The Secretary is required to determine when normal, surplus or shortage conditions occur in the lower Colorado River, based on various factors including storage and hydrologic conditions in the Colorado River Basin.

Normal conditions exist when the Secretary determines that sufficient mainstream water is available to satisfy 7.5 maf of annual consumptive use in the Lower Division states. If a state will not use all of its apportioned water for the year, the Secretary may allow other states of the Lower Division to use the unused apportionment, provided that the use is covered under a contract with the consuming entity.

Surplus conditions exist when the Secretary determines that sufficient mainstream water is available for release to satisfy consumptive use in the Lower Division states in excess of 7.5 maf annually. This excess consumptive use is surplus and is distributed for use in California, Arizona and Nevada in allocations of 50, 46 and 4 percent, respectively. As stated above, if a state will not use all of its apportioned water for the year, the Secretary may allow other states of the Lower Division to use the unused apportionment, provided that the use is covered under a contract with the consuming entity. Surplus water under the Decree, for use in the Lower Division states, was made available by the Secretary in calendar years 1996, 1997, 1998, 1999 and 2000.

Deliveries of surplus water to Mexico in accordance with the Treaty were made in calendar years 1983-1988, 1997, 1998, 1999 and 2000.

Shortage conditions exist when the Secretary determines that insufficient mainstream water is available to satisfy 7.5 maf of annual consumptive use in the Lower Division states. When making a shortage determination, the Secretary must consult with various parties, as set forth in the Decree and consider all relevant factors as specified in the LROC (described above), including Treaty obligations, the priorities set forth in the Decree and the reasonable consumptive use requirements of mainstream water users in

the Lower Division. The Secretary is required to first provide for the satisfaction of the presented perfected rights (PPRs) in the order of their priority, then to users who held contracts on September 30, 1968 (up to 4.4 maf in California) and finally to users who had contracted on September 30, 1968, when the CAP was authorized. To date, a shortage has never been determined.

S.1.4 PURPOSE AND NEED FOR ACTION

To date, the Secretary has applied factors, including but not limited to those found in Article III(3)(b)(i-iv) of the LROC, in annual determinations of the availability of surplus quantities of water for pumping or release from Lake Mead. As a result of actual operating experience and through preparation of AOPs, particularly during recent years when there has been increasing demand for surplus water, the Secretary has determined that there is a need for more specific surplus criteria, consistent with the Decree and applicable federal law, to assist in the Secretary's annual decision making during an interim period.

For many years, California has been diverting more than its normal 4.4 maf apportionment. Prior to 1996, California utilized unused apportionments of other Lower Division states that were made available by the Secretary. Since 1996, California has also utilized surplus water made available by Secretarial determination. California is in the process of developing the means to reduce its annual use of Colorado River water to 4.4 maf. Arizona is approaching full use of its apportionment and Nevada was expected to reach its apportionment in 2000.

Additionally, through adoption of specific interim surplus criteria, the Secretary will be able to afford mainstream users of Colorado River water, particularly those in California who currently utilize surplus flows, a greater degree of predictability with respect to the likely existence, or lack thereof, of surplus conditions on the river in a given year. Adoption of the interim surplus criteria is intended to recognize California's plan to reduce reliance on surplus deliveries, to assist California in moving toward its allocated share of Colorado River water and to avoid hindering such efforts. Implementation of interim surplus criteria would take into account progress, or lack thereof, in California's efforts to achieve these objectives. The surplus criteria would be used to identify the specific amount of surplus water which may be made available in a given year, based upon factors such as the elevation of Lake Mead, during a period within which demand for surplus Colorado River water will be reduced. The increased level of predictability with respect to the prospective existence and quantity of surplus water would assist in planning and operations by all entities that receive surplus Colorado River water pursuant to contracts with the Secretary.

S.1.5 RELATIONSHIP TO UNITED STATES–MEXICO WATER TREATY

Under Article 10(a) of the Treaty, the United Mexican States (Mexico) is entitled to an annual amount of 1.5 maf of Colorado River water. Under Article 10(b) of the Treaty, Mexico may schedule up to an additional 0.2 maf when "there exists a surplus of waters

of the Colorado River in excess of the amount necessary to satisfy uses in the United States." This is in addition to surplus determinations for the Lower Division states made pursuant to Article II(2)(b) of the Decree and Article III(3)(B) of the LROC. The proposed action is not intended to identify, or change in any manner, conditions when Mexico may schedule this additional 0.2 maf. Under current practice, surplus declarations under the Treaty for Mexico are declared when flood control releases are made. Reclamation is currently engaged in discussions with Mexico through the IBWC on the effects of the proposed action.

S.1.6 RELATED AND ON-GOING ACTIONS

A number of ongoing and new actions proposed by Reclamation and other entities are related to the development of interim surplus criteria and the analysis contained in the FEIS. This section describes these actions and their relationship to the development of interim surplus criteria. The following actions have been described in environmental documents, consultation packages under Section 7 of the Endangered Species Act (ESA) or as project planning documents. Where appropriate, the FEIS incorporates by reference information contained in these documents. The documents described below are available for public inspection upon request at Reclamation offices in Boulder City, Nevada; Salt Lake City, Utah; and Phoenix and Yuma, Arizona.

S.1.6.1 CALIFORNIA'S COLORADO RIVER WATER USE PLAN

California's Colorado River Water Use Plan (CA Plan), which was formerly known as the California 4.4 Plan or the 4.4 Plan, calls for conservation measures to be put in place that will reduce California's dependency on surplus Colorado River water. Surplus water is required to meet California's current needs until implementation of the conservation measures can take place. During the period ending in 2016, the State of California has indicated that it intends to reduce its reliance on Colorado River water to meet its water needs above and beyond its 4.4-maf apportionment. It is important for the long-term administration of the system to bring the Lower Basin uses into accordance with the Lower Basin normal apportionment. In order to achieve its goals, California has expressed a need to rely in some measure on the existence of surplus Colorado River water through 2016. These interim surplus criteria could aid California and its primary Colorado River water users as California reduces its consumptive use to 4.4 maf while ensuring that the other Basin States will not be placed at undue risk of future shortages.

The CA Plan contains numerous water conservation projects, intrastate water exchanges and groundwater storage programs. The CA Plan is related to the implementation of the interim surplus criteria in the ways discussed below.

First, implementation of the CA Plan is necessary to ensure the Colorado River system can meet the normal year deliveries in the Lower Basin over the long term. Failure of California to comply with the CA Plan places at risk the objective of providing reliable delivery of water for beneficial consumptive use to Lower Basin users. Therefore, the

Secretary may condition the continuation of interim surplus criteria for the entire period through 2016 on a showing of satisfactory progress in implementing the CA Plan. Regardless of which alternative is ultimately selected, failure of California to carry out the CA Plan may result in termination or suspended application of the proposed interim surplus criteria. In that event, the Secretary would fashion appropriate surplus criteria for the remaining period through 2016.

Second, from the perspective of the State of California, because of the linkage between various elements of the CA Plan and the quantities of water involved, a reliable supply of interim surplus water from the Colorado River is an indispensable pre-condition to successful implementation of the CA Plan.

From the standpoint of environmental documentation and compliance, the CA Plan and its various elements have been, or will be, addressed under separate federal and/or state environmental reporting procedures.

S.1.6.1.1 Imperial Irrigation District/San Diego County Water Authority Water Transfer

The Imperial Irrigation District (IID)/San Diego County Water Authority (SDCWA) water transfer is one of the intrastate exchanges that is a part of the CA Plan. SDCWA has negotiated an agreement for the long-term transfer of conserved water from the IID. Under the proposed contract, IID customers would undertake water conservation efforts to reduce their use of Colorado River water. Water conserved through these efforts would be transferred to SDCWA. The agreement sets the primary transfer quantity at a maximum of 200 kaf/year. After at least 10 years of primary transfers, an additional discretionary component not to exceed 100 kaf/year may be transferred to SDCWA, the Metropolitan Water District of Southern California (MWD) or Coachella Valley Water District (CVWD) in connection with the settlement of water rights disputes between IID and these agencies. The initial transfer target date is 2002, or whenever the conditions necessary for the agreement to be finalized are satisfied or waived, whichever is later. This transfer is being addressed in an ongoing Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) and involves the change in point of delivery of up to 300 kaf/year from Imperial Dam to Parker Dam.

S.1.6.1.2 All-American and Coachella Canal Lining Projects

Two other components of the CA Plan having effects on the river are the All-American and Coachella Canal Lining Projects (the Coachella Canal is a branch of the All-American Canal). These two similar actions involve the concrete lining of unlined portions of the canals to conserve water presently being lost as seepage from the earthen reaches. Together the projects involve a change in point of delivery of 93.7 kaf/year from Imperial Dam for Parker Dam, 67.7 kaf/year for the All-American Canal and 26 kaf/year for the Coachella Canal. The effects of this change in point of delivery are being addressed in the Secretarial Implementation Agreement Environmental Assessment (EA) and Biological Assessment (BA). The Record of Decision (ROD) for

the All-American Canal Lining Project was approved on July 29, 1994. Construction is expected to begin in 2001. A draft EIS/EIR for the Coachella Canal Lining Project was released on September 22, 2000 for public review.

S.1.6.2 GLEN CANYON DAM OPERATIONS

Glen Canyon Dam is operated consistent with the CRSPA and the LROC, which were promulgated in compliance with Section 602 of the CRBPA. Glen Canyon Dam is also operated consistent with the 1996 ROD on the *Operation of Glen Canyon Dam FEIS* developed as directed under the Grand Canyon Protection Act of 1992.

The minimum release from Lake Powell, as specified in the LROC, is 8.23 maf per year. The LROC require that, when Upper Basin storage is greater than the storage required under Section 602(a) of the CRBPA, releases from Lake Powell will periodically be governed by the objective to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell. Because of this equalization provision in the LROC, changes in operations at Lake Mead will, in some years, result in changes in annual release volumes from Lake Powell. It is through this mechanism that delivery of surplus water from Lake Mead can influence the operation of Glen Canyon Dam. Equalization is not required when there exists insufficient storage in the Upper Basin, per Section 602(a) of the CRBPA.

In acknowledgement that the operation of Glen Canyon Dam, as authorized, to maximize power production was having a negative impact on downstream resources, the Secretary determined in July 1989 that an EIS should be prepared. The *Operation of Glen Canyon Dam EIS* developed and analyzed alternative operation scenarios that met statutory responsibilities for protecting downstream resources and achieving other authorized purposes, while protecting Native American interests. A final EIS was completed in March 1995 and the Secretary signed a ROD on October 8, 1996. Reclamation also consulted with the United States Fish and Wildlife Service (Service) under the ESA and incorporated the Service's recommendations into the ROD.

The ROD describes criteria and plans for dam operations and includes other measures to ensure Glen Canyon Dam is operated in a manner consistent with the Grand Canyon Protection Act of 1992. Among these are an Adaptive Management Program, periodic releases for beach/habitat-building flows (BHBFs), beach/habitat-maintenance flows and further study of temperature control.

The ROD is based on the EIS, which contains descriptions and analyses of aquatic and riparian habitats below Glen Canyon Dam, effects of Glen Canyon Dam release patterns on the local ecology, cultural resources, sedimentation processes associated with the maintenance of backwaters and sediment deposits along the river, Native American interests, and relationships between release patterns and the value of hydroelectric energy produced. Analyses of effects on other resources within the affected area are also included. Additional information concerning the operation of Glen Canyon Dam is contained in Section 3.3.

S.1.6.2.1 Adaptive Management Program

The Adaptive Management Program provides a process for assessing the effects of current operations of Glen Canyon Dam on downstream resources and using the results to develop recommendations for modifying operating criteria and other resource management actions. This is accomplished through the Adaptive Management Work Group (AMWG), a federal Advisory Committee. The AMWG consists of stakeholders that are federal and state resource management agencies, representatives of the seven Basin States, Indian Tribes, hydroelectric power marketers, environmental and conservation organizations and recreational and other interest groups. The duties of the AMWG are in an advisory capacity only. Coupled with this advisory role are long-term monitoring and research activities that provide a continual record of resource conditions and new information to evaluate the effectiveness of the operational modifications.

S.1.6.2.2 Beach/Habitat-Building Flows and Beach/Habitat-Maintenance Flows

BHBF releases are scheduled high releases of short duration that are in excess of power plant capacity required for dam safety purposes and are made according to certain specific criteria. These BHBFs are designed to rebuild high elevation sandbars, deposit nutrients, restore backwater channels and provide some of the dynamics of a natural system. The first test of a BHBF was conducted in spring of 1996.

Beach/habitat-maintenance flow releases are releases at or near power plant capacity, which are intended to maintain favorable beach and habitat conditions for recreation and fish and wildlife, and to protect Tribal interests. Beach/habitat-maintenance flow releases can be made in years when no BHBF releases are made.

Both beach/habitat-building and beach/habitat-maintenance flows, along with the testing and evaluation of other types of releases under the AMP, were recommended by the Service to verify a program of flows that would improve habitat conditions for endangered fish. The proposed interim surplus criteria could affect the range of storage conditions in Lake Powell and alter the flexibility to schedule and conduct such releases or to test other flow patterns. The magnitude of this reduction in flexibility has been evaluated in the FEIS for each interim surplus alternative.

S.1.6.2.3 Temperature Control at Glen Canyon Dam

In 1994, the Service issued a *Biological Opinion on the Operation of Glen Canyon Dam* (BO). One of the elements of the reasonable and prudent alternative in the BO, also a common element in the Glen Canyon Dam EIS, was the evaluation of methods to control release temperatures and, if viable, implement controls. Reclamation agreed with this recommendation and included it in the *Operation of Glen Canyon Dam Final Environmental Impact Statement* and subsequent ROD.

Reclamation has issued a draft planning report and EA entitled *Glen Canyon Dam Modifications to Controls and Downstream Temperatures* (Reclamation, 1999). Based on comments to this draft EA, Reclamation is currently in the process of preparing a new draft EA on temperature control at Glen Canyon Dam.

Interim surplus criteria could result in new information related to temperature control at Glen Canyon Dam. Data and information made available from analysis related to interim surplus criteria will be utilized in the revised EA on temperature control at Glen Canyon Dam. Such information would also be considered in the development of an appropriate design for a temperature control device.

S.1.6.3 Actions Related to the Biological and Conference Opinion on Lower Colorado River Operations and Maintenance

Reclamation prepared a BA in accordance with Section 7 of the ESA, addressing effects of ongoing and projected routine lower Colorado River operations and maintenance (Reclamation, 1996). After formal consultation, a Biological and Conference Opinion (BCO) was prepared by the Service (Service, 1997). Pursuant to the reasonable and prudent alternative and 17 specific provisions provided in the BCO, Reclamation is taking various actions that benefit the riparian region of the lower Colorado River and associated species. In particular, these actions include: 1) acquisition, restoration and protection of potential and occupied Southwestern willow flycatcher habitat; 2) extensive life history studies for Southwestern willow flycatcher along 400 miles of the lower Colorado River and other areas, and 3) protection and enhancement of endangered fish species through risk assessments, assisted rearing and development of protected habitats along the lower Colorado River. This five-year BCO provides ESA compliance for Reclamation actions on the lower Colorado River until 2002.

The BA and BCO contain life histories/status of lower Colorado River species, descriptions of ongoing and projected routine operation and maintenance activities, the Secretary's discretionary management activities, operation and maintenance procedures, endangered species conservation program, environmental baseline, effects of ongoing operations, reasonable and prudent alternatives and supporting documentation useful in this FEIS. The 1996 BA and the 1997 BCO did not anticipate or address the effects of specific interim surplus criteria on the species considered. A separate Section 7 ESA consultation is in progress for the proposed action.

S.1.6.4 Lower Colorado River Multi-Species Conservation Program

Following the designation of critical habitat for three endangered fish species on nearly all of the lower Colorado River in April of 1994, the three Lower Basin states of Arizona, California and Nevada, Reclamation and the Service initiated the Lower Colorado River Multi-Species Conservation Program (LCRMSCP), which was one of the reasonable and prudent provisions of the five-year BCO received in 1997. The purpose of the LCRMSCP is to obtain long-term (50-year) ESA compliance for both federal and non-federal water and power interests. The LCRMSCP is a partnership of

federal, state, Tribal, and other public and private stakeholders with an interest in managing the water and related resources of the lower Colorado River Basin. In August 1995, Interior and Arizona, California and Nevada entered into a Memorandum of Agreement (MOA) and later a Memorandum of Clarification (MOC) for development of the LCRMSCP. The purpose of the MOA/MOC was to initiate development of an LCRMSCP that would accomplish the following objectives:

- Conserve habitat and work toward the recovery of threatened and endangered species and reduce the likelihood of additional species listing under the ESA; and
- Accommodate current water diversions and power production and optimize opportunities for future water and power development.

The LCRMSCP is currently under development and it is anticipated that the final EIS-environmental impact report will be finalized in 2001. Once the LCRMSCP is accepted by the Service, Reclamation and other federal agencies, as well as the participating non-federal partners, will have achieved ESA compliance for ongoing and future actions.

Since the interim surplus criteria determination is scheduled to be completed prior to the completion of the LCRMSCP, a separate Section 7 consultation is in progress with the Service on the anticipated effects of implementing the interim surplus criteria.

S.1.6.5 SECRETARIAL IMPLEMENTATION AGREEMENT RELATED TO CALIFORNIA'S COLORADO RIVER WATER USE PLAN

Within California, the allocation of Colorado River water is stipulated by various existing agreements among the seven parties with diversion rights. Recently, these parties have negotiated a *Quantification Settlement Agreement* that further defines the priorities for use of Colorado River water in California. This agreement provides a basis for various water conservation and transfer measures described in the CA Plan. The water transfers would require changes in the points at which the Secretary would deliver transferred water to various California entities, as compared with provisions in existing water delivery contracts. The operational changes caused by the water transfers are being addressed in separate NEPA and ESA documentation.

S.1.6.6 OFFSTREAM STORAGE OF COLORADO RIVER WATER AND DEVELOPMENT AND RELEASE OF INTENTIONALLY CREATED UNUSED APPORTIONMENT IN THE LOWER DIVISION STATES

The above titled rule establishes a procedural framework for the Secretary to follow in considering, participating in, and administering Storage and Interstate Release Agreements among the states of Arizona, California and Nevada (Lower Division states). The Storage and Interstate Release Agreements would permit state-authorized entities to store Colorado River water offstream, develop intentionally created unused apportionment (ICUA) and make ICUA available to the Secretary for release for use in

another Lower Division state. This rule provides a framework only and does not authorize any specific activities. The rule does not affect any Colorado River water entitlement holder's right to use its full water entitlement, and does not deal with intrastate storage and distribution of water. The rule only facilitates voluntary interstate water transactions that can help satisfy regional water demands by increasing the efficiency, flexibility and certainty in Colorado River management. A Finding of No Significant Impact was approved on October 1, 1999.

S.2 ALTERNATIVES

S.2.1 DEVELOPMENT OF ALTERNATIVES

The FEIS considers five interim surplus criteria alternatives as well as a No Action Alternative/baseline that was developed for comparison of potential effects. The five action alternatives considered include the Basin States Alternative (preferred alternative), the Flood Control Alternative, the Six States Alternative, the California Alternative and the Shortage Protection Alternative. The following section discusses the strategies and origins of the action alternatives. Other alternatives, including a proposal by the Pacific Institute, were considered but eliminated from further analysis. Those alternatives, and the reasons for their elimination from further analysis, are discussed in Chapter 2 of Volume I.

S.2.1.1 ORIGINS OF CALIFORNIA, SIX STATES AND BASIN STATES ALTERNATIVES

In 1997, California presented to the other Basin States its draft 4.4 Plan, a plan to achieve a reduction in its dependence on surplus water from the Colorado River, through various conservation measures, water exchanges and conjunctive use programs. One of the elements of the draft 4.4 Plan was the expectation that the Secretary would continue to determine surplus conditions on the Colorado River until 2015. California proposed criteria on which the Secretary would base his determinations of surplus conditions during the interim period.

In 1998, in response to California's proposal of interim surplus criteria, the other six states within the Colorado River Basin (Six States) submitted a proposal with surplus criteria that were similar in structure to those in California's proposal. Under the proposal from the Six States, use of surplus water supplies would be limited depending on the occurrence of various specified Lake Mead surface elevations. The interim surplus criteria proposed by the Six States were used to formulate the "Six States Alternative."

California subsequently proposed specific interim surplus criteria that were attached to the October 15, 1999 *Key Terms for Quantification Settlement Among the State of California, Imperial Irrigation District, Coachella Valley Water District, and Metropolitan Water District of Southern California*. California also updated, renamed and re-released its 4.4 Plan in May 2000. The revised plan is now known as California's Colorado River Water Use Plan (CA Plan). The interim surplus criteria

proposal stemming from the CA Plan and Quantification Settlement Agreement was used to formulate the "California Alternative."

In July 2000, during the public comment period on the DEIS, Reclamation received a draft proposal for interim surplus criteria from the seven Colorado River Basin States (Seven States). After a preliminary review of that proposal, Reclamation published it in the August 8, 2000 *Federal Register* for review and consideration by the public during the public review period for the DEIS. Reclamation published minor corrections to the proposal in a *Federal Register* notice of September 22, 2000. Reclamation derived the Basin States Alternative in the FEIS from the draft Seven States Proposal.

S.2.1.2 UTILIZATION OF PROPOSALS FROM BASIN STATES

Various proposals submitted by individual Colorado River Basin states or groups of states were used by Reclamation to formulate interim surplus criteria alternatives. In recognition of the need to limit the delivery of surplus water at lower Lake Mead water levels, these proposals specified allowable uses of surplus water at various triggering levels.

The Secretary will continue to apportion surplus water consistent with the applicable provisions of the Decree, under which surplus water is divided 50 percent to California, 46 percent to Arizona, and 4 percent to Nevada. The Secretary also intends to appropriately report the accumulated volume of water delivered to MWD under surplus conditions. The Secretary also intends to honor any forbearance arrangements made by various parties for the delivery of surplus water or reparations for future shortage conditions.

S.2.2 DESCRIPTION OF ALTERNATIVES

S.2.2.1 NO ACTION ALTERNATIVE AND BASELINE CONDITIONS

As required by NEPA, a No Action alternative must be considered during the environmental review process. Under the No Action Alternative, determinations of surplus would continue to be made on an annual basis, in the AOP, pursuant to the LROC and the Decree as discussed above. The No Action Alternative represents the future AOP process without interim surplus criteria. Surplus determinations consider such factors as end-of-year system storage, potential runoff conditions, projected water demands of the Basin States and the Secretary's discretion in addressing year-to-year issues. However, the year-to-year variation in the conditions considered by the Secretary in making surplus water determinations makes projections of surplus water availability highly uncertain.

The approach used in the FEIS for analyzing the hydrologic aspects of the interim surplus criteria alternatives was to use a computer model that simulates specific operating parameters and constraints. In order to follow CEQ guidelines calling for a No Action alternative for use as a "baseline" against which to compare project

alternatives, Reclamation selected a specific operating strategy for use as a baseline condition, which could be described mathematically in the model.

The baseline is based on a 70R spill avoidance strategy (as described in Section S.2.2.1.2). Reclamation has utilized a 70R strategy for both planning purposes and studies of surplus determinations in past years. While the 70R strategy is used to represent baseline conditions, it does not represent a decision by Reclamation to utilize the 70R strategy for determination of future surplus conditions in the absence of interim surplus criteria.

S.2.2.1.1 Approach to Surplus Water Determination

As discussed above, the 70R operating strategy is being used as a baseline to show possible future operating conditions in the absence of interim surplus criteria. The primary effect of simulating operation with the 70R operating strategy would be that surplus conditions would only be determined when Lake Mead is nearly full.

S.2.2.1.2 70R Baseline Surplus Triggers

The 70R baseline strategy involves assuming a 70-percentile inflow into the system, subtracting out the consumptive uses and system losses and checking the results to see if all of the water could be stored or if flood control releases would be required. If flood control releases would be required, additional water is made available to the Lower Basin states beyond 7.5 maf. The notation 70R refers to the specific inflow where 70 percent of the historical natural runoff is less than this value (17.4 maf) for the Colorado River basin at Lee Ferry.

The 70R trigger line rises from approximately 1199 feet msl in 2002 to 1205 feet msl in 2050. The gradual rise of the 70R trigger line is the result of increasing water use in the Upper Basin. Under baseline conditions, when a surplus condition is determined to occur, surplus water would be made available to fill all water orders by holders of surplus water contracts in the Lower Division states.

S.2.2.2 Basin States Alternative (Preferred Alternative)

Reclamation has identified the Basin States Alternative as the preferred alternative in the FEIS. The Basin States Alternative is similar to, and based upon, information submitted to the Secretary by representatives of the governors of the states of Colorado, Wyoming, Utah, New Mexico, Arizona, Nevada and California. After receipt of this information (during the public comment period), Reclamation shared the submission with the public (through the *Federal Register* and Reclamation's surplus criteria web sites) for consideration and comment. Reclamation then analyzed the states' submission and crafted this additional alternative for inclusion in the FEIS. Some of the information submitted for the Department's review was outside of the scope of the proposed action for adoption of interim surplus criteria and was therefore not included as part of the Basin States Alternative (e.g., adoption of shortage criteria and adoption

of surplus criteria beyond the 15-year period) as presented in this FEIS. With respect to the information within the scope of the proposed action, Reclamation found the Basin States Alternative to be a reasonable alternative and has fully analyzed all environmental effects of this alternative in this FEIS. The identified environmental effects of the Basin States Alternative are well within the range of anticipated effects of the alternatives presented in the DEIS and do not affect the environment in a manner not already considered in the DEIS.

Reclamation selected the Basin States Alternative as its preferred alternative based on Reclamation's determination that it best meets all aspects of the purpose and need for the action, including the needs to remain in place for the entire period of the interim criteria, to garner support among the Basin States that will enhance the Secretary's ability to manage the Colorado River reservoirs in a manner that balances all existing needs for these precious water supplies, and to assist in the Secretary's efforts to insure that California water users reduce their over reliance on surplus Colorado River water. Reclamation notes the important role of the Basin States in the statutory framework for administration of Colorado River Basin entitlements and the significance that a seven-state consensus represents on this issue. Thus, based on all available information, this alternative appears to be the most reasonable and feasible alternative analyzed.

S.2.2.2.1 Approach to Surplus Water Determination

The Basin States Alternative specifies ranges of Lake Mead water surface elevations to be used through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation were to decline, the amount of surplus water would be reduced. The interim criteria would be reviewed at five-year intervals with the LROC (and additionally as needed), and revised as needed based upon actual operational experience.

S.2.2.2.2 Basin States Alternative Surplus Triggers

The surplus determination elevations under the Basin States Alternative consist of the tiered Lake Mead water surface elevations listed below, each of which is associated with certain stipulations on the purposes for which surplus water could be used. Proceeding from higher to lower water levels, the elevation tiers (also referred to as levels) are as follows:

Tier 1 - 70R Line (approximately 1199 to 1201 feet msl)
Tier 2 - 1145 feet msl
Tier 3 - 1125 feet msl

S.2.2.3 FLOOD CONTROL ALTERNATIVE

S.2.2.3.1 Approach to Surplus Water Determination

Under the Flood Control Alternative, a surplus condition is determined to exist when flood control releases from Lake Mead are occurring or projected to occur in the subsequent year. The method of determining need for flood control releases is based on flood control regulations published by the Los Angeles District of the United States Army Corps of Engineers (Corps) and the Field Working Agreement between the Corps and Reclamation.

S.2.2.3.2 Flood Control Alternative Surplus Triggers

Under the flood control strategy, a surplus is determined when the Corps flood control regulations require releases from Lake Mead in excess of downstream demand. If flood control releases are required, surplus conditions are determined to be in effect. The average flood control triggering elevation is approximately 1211 feet msl. In practice, flood control releases are not based on the average trigger elevation, but would be determined each month by following the Corps regulations. When a flood control surplus is determined, surplus water would be made available for all established uses by contractors for surplus water in the Lower Division states.

S.2.2.4 SIX STATES ALTERNATIVE

S.2.2.4.1 Approach to Surplus Water Determination

The Six States Alternative specifies ranges of Lake Mead water surface elevations to be used through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation were to decline, the amount of surplus water would be reduced. The interim criteria would be reviewed at five-year intervals with the LROC and as needed based upon actual operational experience.

S.2.2.4.2 Six States Alternative Surplus Triggers

The surplus determination elevations under the Six States Alternative consist of the tiered Lake Mead water surface elevations listed below, each of which is associated with certain stipulations on the purposes for which surplus water could be used. The tiered elevations are as follows, proceeding from higher to lower water levels:

Tier 1 - 70R Line (approximately 1199 to 1201 feet msl)
Tier 2 - 1145 feet msl
Tier 3 - 1125 feet msl

S.2.2.5 CALIFORNIA ALTERNATIVE

S.2.2.5.1 Approach to Surplus Water Determination

The California Alternative specifies Lake Mead water surface elevations to be used for the interim period through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation declines, the amount of surplus water would be reduced.

S.2.2.5.2 California Alternative Surplus Triggers

The Lake Mead elevations at which surplus conditions would be determined under the California Alternative are indicated by a series of tiered, sloping lines from the present to 2016. Each tiered line would be coupled with limitations on the amount of surplus water available at that tier. Each tier is defined as a trigger line that rises gradually year by year to 2016, in recognition of the gradually increasing water demand of the Upper Division states. The elevations associated with the three tiers are as follows:

Tier 1 - 1160 feet msl to 1166 feet msl
Tier 2 - 1116 feet msl to 1125 feet msl
Tier 3 - 1098 feet msl to 1102 feet msl

S.2.2.6 SHORTAGE PROTECTION ALTERNATIVE

S.2.2.6.1 Approach to Surplus Water Determination

The Shortage Protection Alternative is based on maintaining an amount of water in Lake Mead necessary to provide a normal annual supply of 7.5 maf for the Lower Division, 1.5 maf for Mexico and storage necessary to provide an 80 percent probability of avoiding future shortages.

S.2.2.6.2 Shortage Protection Alternative Surplus Triggers

The surplus triggers under this alternative range from an approximate Lake Mead initial elevation of 1126 feet msl to an elevation of 1155 feet msl at the end of the interim period. At Lake Mead elevations above the surplus trigger, surplus conditions would be determined to be in effect and surplus water would be available for use by the Lower Division states. Below the trigger-elevation, surplus water would not be made available.

S.3 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

S.3.1 USE OF MODELING TO IDENTIFY POTENTIAL FUTURE COLORADO RIVER SYSTEM CONDITIONS

To determine the potential effects of the interim surplus criteria alternatives, modeling of the Colorado River system was conducted. Modeling provides projections of potential future Colorado River system conditions (i.e., reservoir surface elevations, river flows, salinity, etc.). The modeling results allow a comparison of potential future conditions under the various interim surplus criteria alternatives and baseline conditions. As such, much of the analyses contained within the FEIS are based upon potential effects of changed flows and water levels within the Colorado River and mainstream reservoirs.

S.3.2 BASELINE CONDITIONS

As discussed above, the No Action Alternative does not provide consistent specific criteria for determining surplus conditions. As such, it is not possible to model the No Action Alternative. However, in order to provide a reasonable analytical projection of potential future system conditions without interim surplus criteria, a reasonable baseline surplus strategy (70R) was utilized. This baseline represents a definable surplus criteria based on recent operational decisions. The 70R strategy is based upon recent secretarial operating decisions and was modeled to develop a projection of baseline conditions for comparison with the alternatives in the FEIS.

S.3.3 IMPACT DETERMINATION APPROACH

The analysis of potential effects for each issue considered is based primarily upon the results of modeling. Following the identification of conditions important to each issue, the potential effects of various system conditions over the general range of their possible occurrence (as identified by the range of modeling output for various parameters) are identified for each issue. The potential effects of the various interim surplus criteria alternatives are presented in terms of the incremental differences in probabilities (or projected circumstances associated with a given probability) between baseline conditions and the alternatives.

S.3.4 PERIOD OF ANALYSIS

The FEIS addresses interim surplus criteria that would be used during the years 2001 through 2015 for determining whether surplus water would be available during the years 2002 through 2016. Due to the potential for effects beyond the 15-year interim period, the modeling and impact analyses extend through the year 2050. It is important to note that modeling output and associated impact analyses become more uncertain over time as a result of increased uncertainty of future system conditions (including hydrologic conditions), as well as uncertainty with regard to future operational decisions that will affect circumstances within the Colorado River system.

S.3.5 POTENTIALLY AFFECTED AREA

Interim surplus criteria could affect the operation of the Colorado River system (i.e., reservoir levels and river flow volumes) as a result of surplus determinations and associated water deliveries that may not have occurred in the absence of such criteria.

Interim surplus criteria are based on system conditions and hydrology. Water supply to the Lower Division states of Arizona, California and Nevada is achieved primarily through releases and pumping from Lake Mead. As a result of Lake Powell and Lake Mead equalization requirements, interim surplus criteria effects on Lake Mead surface elevations could also influence Lake Powell surface elevations and Glen Canyon Dam releases. However, operation of the other Upper Basin reservoirs is independent of Lake Powell. Therefore, the upstream limit of the potentially affected area under consideration in this FEIS is the full pool elevation of Lake Powell. The downstream limit within the United States is the Southerly International Boundary (SIB) between the United States and Mexico (see Map S-1). Also addressed in the FEIS are potential transboundary impacts in Mexico pursuant to Executive Order 12114 - Environmental Effects Abroad of Major Federal Actions, January 4, 1997, and the July 1, 1997 Council on Environmental Quality (CEQ) Guidelines on NEPA Analyses for Transboundary Impacts.

In addition to influencing conditions within the Colorado River system, it is recognized that continued delivery of surplus water that could result from interim surplus criteria would recognize ongoing and proposed state actions in the Lower Basin. These actions could result in environmental effects outside of the river corridor. However, these actions have independent utility and are not caused by or dependent on interim surplus criteria for their implementation. Environmental compliance would be required on a case-by-case basis prior to their implementation. Therefore, Reclamation determined that the appropriate scope of this analysis is to consider only those potential effects that could occur within the Colorado River corridor as defined by the 100-year flood plain and reservoir maximum water surface elevations.

S.3.6 COMPARISON OF SURPLUS ALTERNATIVES TO BASELINE CONDITIONS

S.3.6.1 EFFECTS ON RESERVOIR SURFACE ELEVATIONS AND RIVER FLOWS

Figures S-1 and S- 2 present the 90th, 50th and 10th percentile Lake Powell and Lake Mead surface elevations indicated through system modeling for baseline conditions and the interim surplus criteria alternatives. These figures can be used for comparing the relative differences in the general lake level trends that result from the simulation of future conditions under the baseline and the interim surplus criteria alternatives. A complete explanation of the modeling process and results can be found in Section 3.3 of the FEIS.

Figure S-1
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

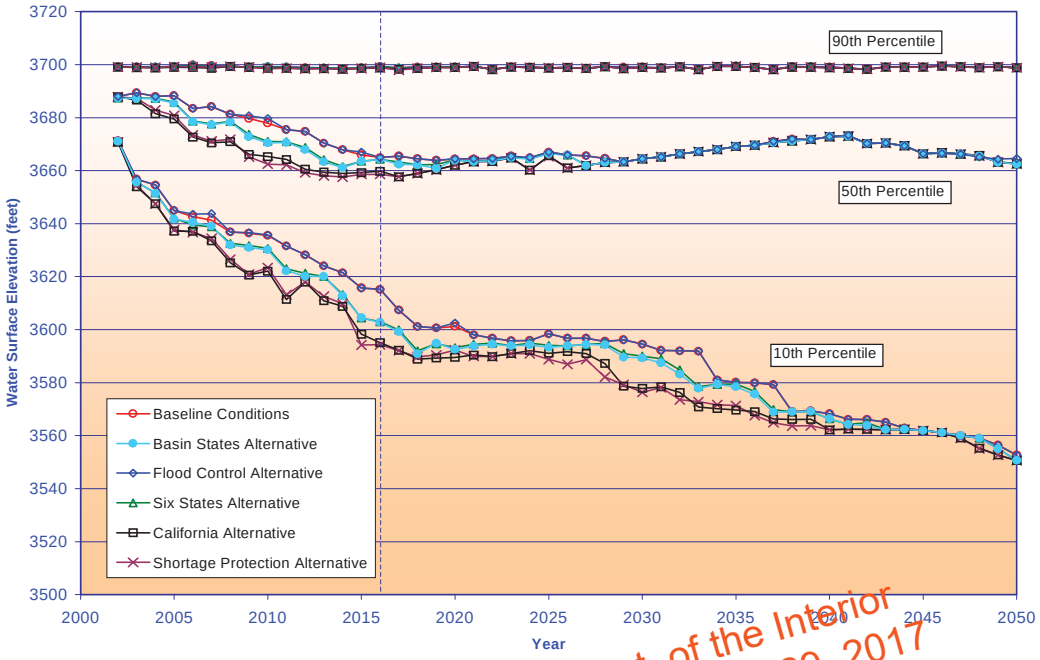
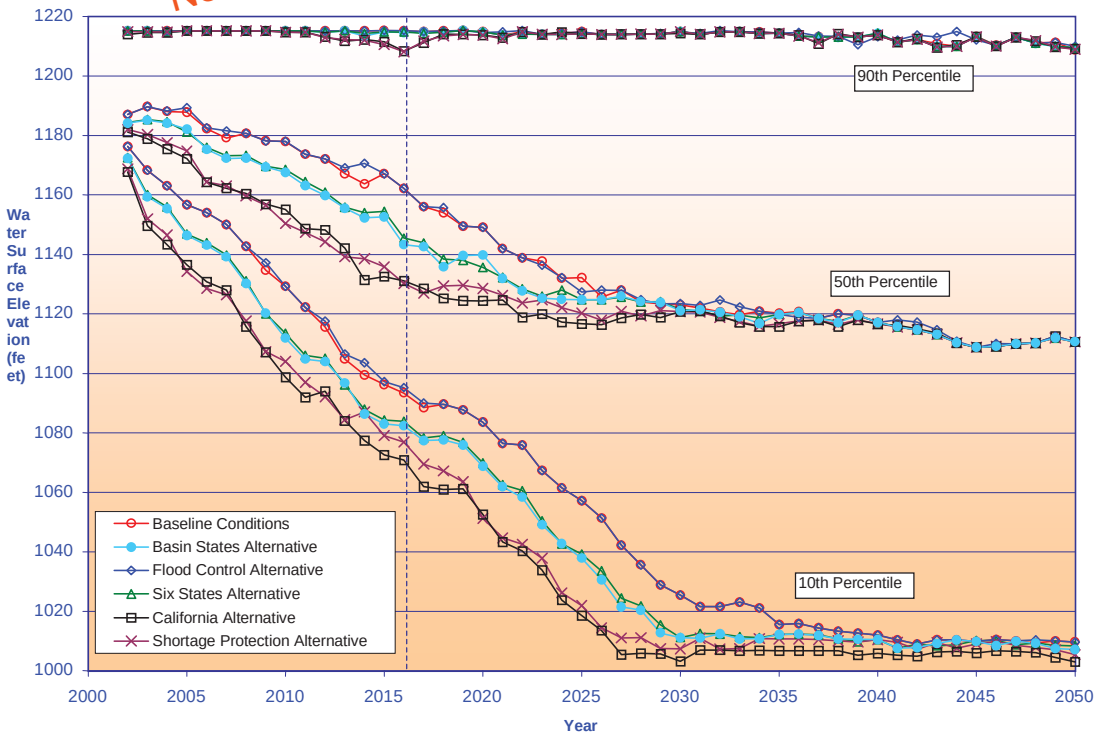


Figure S-2
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
90th, 50th and 10th Percentile Values



As illustrated in Figure S-1, the Flood Control Alternative could potentially result in the highest Lake Powell water levels. The Shortage Protection Alternative and the California Alternative could potentially result in the lowest water levels. The baseline conditions yield similar levels to those observed under the Flood Control Alternative. The water levels observed under the California Alternative are similar to those observed under the Shortage Protection Alternative. The results obtained under the Six States and Basin States alternatives are similar, and fall between baseline conditions and the Shortage Protection Alternative.

As illustrated in Figure S-2, the Flood Control Alternative could potentially result in the highest Lake Mead water levels. The California Alternative could potentially result in the lowest water levels. The water levels observed under the Shortage Protection Alternative are similar to those of the California Alternative, with some years slightly lower. The baseline conditions yield slightly lower levels than the Flood Control Alternative, but the differences are very small. The results obtained under the Six States and Basin States alternatives are similar, and fall between the Flood Control and Shortage Protection alternatives.

River flows would be affected to a limited degree by the interim surplus criteria alternatives. Flows from Glen Canyon Dam, which would be influenced by the adoption of interim surplus criteria, will remain within the range of flows analyzed in detail in the Glen Canyon Dam EIS. Therefore, effects of potential changes in the frequencies of these flows on downstream resources need no further analysis outside of the ROD for Glen Canyon Dam operations and the Adaptive Management Program.

River flows in the reaches between Hoover Dam and the SIB would also be affected to a limited degree by the interim surplus criteria alternatives. Flows to meet downstream demands would typically increase, but remain well within the current operational ranges for those reaches. The frequency of large flows in those reaches due to flood control releases at Hoover Dam would typically decrease. Detailed discussions of the potential effects on river flows are included in Sections 3.3 and 3.6 of the FEIS.

S.3.6.2 SUMMARY OF ENVIRONMENTAL IMPACTS

Table S-1 summarizes the potential effects of interim surplus criteria on the various resource issues analyzed in the FEIS.

S.3.6.3 ENVIRONMENTAL COMMITMENTS

Impacts are associated with changes in the difference between probabilities of occurrence for specific resource issues under study when comparing the action alternatives to baseline conditions. Reclamation has determined that most of the potential impacts identified are not of a magnitude that would require specific mitigation measures to reduce or eliminate their occurrence because the small changes in probabilities of occurrence are within Reclamation's current operational regime and

authorities under applicable federal law. In recognition of potential effects that could occur under baseline conditions or with implementation of the interim surplus criteria alternatives under consideration, Reclamation has developed a number of environmental commitments, described below, that will be undertaken if interim surplus criteria are implemented. Some commitments are the result of compliance with specific consultation requirements.

S.3.6.3.1 Water Quality

Reclamation will continue to monitor salinity and total dissolved solids on the Colorado River as part of the ongoing Colorado River Basin Salinity Control Program to ensure compliance with the numeric criteria on the river as set forth in the Forum's 1999 Annual Review.

Reclamation will continue to participate in the Lake Mead Water Quality Forum and the Las Vegas Wash Coordination Committee as a principal and funding partner in studies of water quality in the Las Vegas Wash and Lake Mead. Reclamation is an active partner in the restoration of the Las Vegas Wash wetlands.

Reclamation is acquiring and will continue to acquire riparian and wetland habitat around Lake Mead and on the Lower Colorado River related to ongoing and projected routine operations.

Reclamation will continue to participate with the Nevada Division of Environmental Protection and Kerr-McGee Chemical Company in the perchlorate remediation program of groundwater discharge points along Las Vegas Wash that will reduce the amount of this contaminant entering the Colorado River.

Reclamation will continue to monitor river operations, reservoir levels and water supply and make this information available to the Colorado River Management Work Group, agencies and the public. See also Reclamation's website (http://www.lc.usbr.gov and http://www.uc.usbr.gov).

S.3.6.3.2 Riverflow Issues

Reclamation will continue to work with the stakeholders in the Adaptive Management Program to develop an experimental flow program for the operations of Glen Canyon Dam which includes BHBFs and is designed to protect, mitigate adverse impacts to and improve the values for which GCNP and GCNRA were established.

S.3.6.3.3 Aquatic Resources

Reclamation will initiate a temperature monitoring program below Hoover Dam with state and other federal agencies to document temperature changes related to baseline and implementation of interim surplus criteria and assess their potential effects on listed

species and the sport fishery. The existing hydrolab below Hoover Dam will be modified as necessary to provide this temperature data.

S.3.6.3.4 Special-Status Species

Section 7 consultation is in progress and commitments will be identified in the Record of Decision.

S.3.6.3.5 Recreation

Reclamation is initiating a bathymetric survey of Lake Mead in fiscal year 2001 and will coordinate with the Lake Mead National Recreation Area to identify critical recreation facility elevations and navigational hazards that would be present under various reservoir surface elevations.

Reclamation will continue to monitor river operations, reservoir levels and water supply and make this information available to the Colorado River Management Work Group, agencies and the public. This operational information will provide the Lake Mead National Recreation Area and the Glen Canyon National Recreation Area with probabilities for future reservoir elevations to assist in management of navigational aids, recreation facilities, other resources and fiscal planning.

Reclamation will continue its consultation and coordination with the Glen Canyon National Recreation Area and the Navajo Nation on the development of Antelope Point as a resort destination.

S.3.6.3.6 Cultural Resources

Reclamation shall continue to consult and coordinate with the State Historic Preservation Officer, the Advisory Council on Historic Preservation (Council), Glen Canyon National Recreation Area, Lake Mead National Recreation Area, Tribes and interested parties with regard to the potential effects of the proposed action as required by Sections 106 and 110 of the National Historic Preservation Act following the Council's recommended approach for consultation for the Protection of Historic Properties found at 36 CFR 800.

S.3.6.3.7 Transboundary Impacts

It is the position of the United States State Department, through the United States Section of the International Boundary and Water Commission (USIBWC), that the United States does not mitigate for impacts in a foreign county. The United States will continue to participate with Mexico through the USIBWC Technical Work Groups to develop cooperative projects beneficial to both countries.

S.4 OTHER NEPA CONSIDERATIONS

S.4.1 CUMULATIVE IMPACTS

A cumulative impact is an impact that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Effects that could occur within the United States as a result of interim surplus criteria are each associated with potential changes in the probabilities for Lake Mead and Lake Powell surface elevation reductions and changes in Colorado River flows from Glen Canyon Dam to the SIB. Generally, other actions that could result in cumulative impacts when considered in tandem with the effects of interim surplus criteria have been incorporated into modeling of future system conditions. Such actions include future increases in consumptive use of Colorado River water in the Upper Division states, intrastate water transfers in the Lower Division states and various requirements and constraints applied to the operation of the Colorado River system.

The environmental effects of the various components of the CA Plan, including the various intrastate storage facilities (such as Cadiz, Hayfield/Chuckwalla and Desert/Coachella projects) and the other related and ongoing actions, are undergoing separate compliance. Where there is a federal nexus to actions in California, a combined California Environmental Quality Act (CEQA) and NEPA compliance document is being prepared.

Potential cumulative effects to the resources affected by surplus criteria were analyzed within the 100-year floodplain of the lower Colorado River from the full-pool elevation of Lake Powell to the Gulf of California in Mexico through year 2050. Only the issue area of “transboundary impacts” was identified as possibly experiencing cumulative effects.

No past, present or reasonably foreseeable actions in the United States are expected to result in cumulative impacts to the issue area of transboundary impacts. In addition to the direct and indirect effects on the physical and natural environment in Mexico from actions identified by Mexico, it is recognized that some future actions taken by Mexico may have a cumulative effect. Exactly what these action are is not known at this time. Any impacts of these projects are the responsibility of Mexico.

In addition, Reclamation is consulting with the Service on potential adverse effects to species found in both Mexico and the United States. For potentially affected species found only in Mexico, Reclamation is consulting with the National Marine Fisheries Service. Concurrent with these consultations, Reclamation is also continuing dialog with Mexico, through the IBWC’s Fourth Technical Work Group, to reach mutually agreeable solutions to address cumulative impacts.

S.4.2 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Because the implementation of interim surplus criteria is a management action that would require no direct physical change to the environment, for the purposes of this discussion, short-term uses of resources are limited to potential changes in the probability for certain environmental effects to occur as a result of changed system conditions. Also for the purposes of this discussion, long-term productivity refers to the benefits that would be realized during and following the period in which interim surplus criteria would be in place.

The benefit sought by means of the interim surplus criteria alternatives consists of increasing the efficiency of the Secretary's annual decision-making process regarding the availability of Colorado River water. This would afford the mainstream users of this water a greater degree of predictability which would assist them in their water resources planning and operation.

The resources that may be affected in the short-term would be primarily those affected by lower reservoir levels. The effects of the interim surplus criteria on those resources would depend on the alternative selected for implementation. The Flood Control Alternative would result in insignificant changes in reservoir levels from baseline conditions. The other four alternatives would tend to cause lower average water levels than baseline conditions by 2016 and for a limited period of time thereafter. However, these alternatives would have a greater probability of surplus water than the Flood Control Alternative or baseline conditions through the year 2016. Long-term benefits that would be realized due to interim surplus criteria would include increased opportunities for making more efficient use of Colorado River water supplies.

S.4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments are decisions affecting renewable resources such as soils, wetlands and waterfowl habitat. Such decisions are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at great expense or because they would cause the resource to be destroyed or removed.

The application of the interim surplus criteria would include reviews at five-year intervals to consider the workability of the criteria in light of the multiple purposes served by the operation of the Colorado River system, including environmental maintenance. Based on those reviews, interim surplus criteria could be revised or eliminated as needed. If California fails to meet its water conservation and management goals throughout the stipulated term of implementation of the criteria (through 2016), the Secretary may choose to terminate the interim criteria and revert to the 70R strategy. Finally, after 2016, determinations of the availability of surplus will revert to the AOP process.

None of the resources assessed in the FEIS would experience a deterioration in condition such that the resource would be destroyed or removed as a result of implementation of interim surplus criteria or under the No Action Alternative. The Colorado River System may also reset at any time in the future, due to high inflows resulting in full reservoirs. There would be no construction of facilities needed to facilitate the Secretary's determination of surplus water under the criteria.

Irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used.

All of the resources assessed in the FEIS would continue to be available for production or use under any of the alternatives; however, application of the interim surplus criteria may result in a determination for any given year that surplus water is available from the Colorado River. That water could also have been determined to be surplus in the absence of interim surplus criteria through the AOP process. Although water is a renewable resource, the delivery of surplus water under all of the alternatives, including no action, would irretrievably commit (to beneficial consumptive uses) the water declared to be surplus, but authorized by the *Law of the River*.

S.5 CONSULTATION AND COORDINATION

S.5.1 GENERAL PUBLIC INVOLVEMENT ACTIVITIES

The public involvement program leading to the FEIS consisted essentially of two phases: project scoping, and public hearings and public review of the DEIS.

S.5.1.1 PROJECT SCOPING

In 1999, Reclamation conducted a public scoping process that featured public scoping meetings to inform interested parties of the purpose and need for the development of interim surplus criteria, and to obtain public comment to assist in identifying the scope of the proposed action and environmental issues to be addressed in the DEIS. The scoping meetings were held in June 1999 at Las Vegas, Nevada; Phoenix, Arizona; Ontario, California; and Salt Lake City, Utah. The meetings were announced in Federal Register notices on May 18, 1999 and May 28, 1999, on Reclamation's Lower Colorado Region internet website, and by a press release on May 28, 1999. The press release was mailed not only to the media but also to hundreds of federal, state and local agencies, non-governmental organizations and private citizens known to have an interest in Colorado River operations. The public was asked to identify any concerns about development and implementation of the interim surplus criteria.

Public comments in the form of letters to Reclamation (35 letters) and oral responses at the scoping meetings (eight presenters) expressed numerous concerns regarding the effect of the proposed interim surplus criteria on the future quantity of water available from the Colorado River, and other resource issues. Based on the scoping comments,

Reclamation issued a Notice of Intent to prepare the DEIS in the *Federal Register* on December 7, 1999.

Reclamation also discussed the development of the proposed interim surplus criteria with various agencies and groups at their own regular meetings or at meetings set up by Reclamation. Included were Indian Tribes and Indian Communities having allocations of Colorado River water, Basin States water resource departments, various water agencies within the States, contractors for federal hydropower, environmental groups water agencies of the United Mexican States (Mexico). The coordination activities with each agency or group are summarized below. Table S-2 lists the agencies and organizations that were invited to such meetings by letter, and/or met with Reclamation regarding interim surplus criteria on other occasions.

S.5.1.2 PUBLIC REVIEW OF DEIS

The DEIS was distributed to interested Federal, Tribal, State and Local entities and members of the general public for a 60-day review when it was filed with EPA on July 7, 2000, and announced in the *Federal Register*. The DEIS was sent to 407 interested parties on Reclamation's mailing list, and a copy of the DEIS was made available for public viewing on Reclamation's Lower Colorado Region web site. Reclamation conducted a public technical meeting at Las Vegas, Nevada on August 15, 2000, to provide information and answer questions regarding the modeling process for analysis in the DEIS. Between August 21 and August 24, 2000, Reclamation conducted public hearings on the DEIS in Ontario, California; Las Vegas, Nevada; Salt Lake City, Utah; and Phoenix, Arizona.

When the public review period closed on September 8, 2000, Reclamation received 68 comment letters from the public which, along with Reclamation's responses, are included in Volume III of the FEIS. Individual comments from the public resulted in technical and editorial changes to the document. These included a change in the baseline operating strategy, better definition of Tribal water rights and diversions, inclusion of the Basin States Alternative and refinements in descriptions of alternatives and operational modeling results.

After the DEIS was completed and ready for public review and comment, Reclamation received the document "Interim Surplus Guidelines, Working Draft" from the Seven Basin States (Seven States Proposal). Reclamation made a preliminary review of the specific surplus criteria in the information presented by the basin states, and made a preliminary determination that the criteria were within the range of alternatives and impacts analyzed in the DEIS. After its review of the Seven States Proposal, Reclamation published it in the Federal Register of August 8, 2000, for review and consideration by the public during the public review period for the DEIS.

S.5.2 FEDERAL AGENCY COORDINATION

S.5.2.1 NATIONAL PARK SERVICE

NPS is a cooperating agency with Reclamation for the purpose of NEPA compliance for the interim surplus criteria, in recognition of its administration of national park and recreation areas along the Colorado River corridor. NPS staff participated in numerous meetings with Reclamation's project evaluation team and participated in internal document reviews as sections of the DEIS were being prepared. This facilitated close coordination with the NPS regarding resources and facilities potentially effected and the nature of the effects. The NPS offices involved in these activities are those at the GCNRA, Grand Canyon National Park and the LMNRA, under the coordination of the office at the GCNRA.

S.5.2.2 U.S. SECTION OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION

The United States Section of the IBWC (USIBWC) is a cooperating agency with Reclamation for the purposes of NEPA compliance for the interim surplus criteria, in recognition of its administration of Treaty obligations with Mexico. As such, USIBWC staff participated in numerous meetings with Reclamation's project evaluation team and participated in internal document reviews as sections of the DEIS were being prepared. This facilitated close coordination with the USIBWC in developing information needed for this FEIS and in Reclamation's participation in the consultation with Mexico. The USIBWC head office at El Paso, Texas was directly involved.

S.5.2.3 U.S. BUREAU OF INDIAN AFFAIRS

The Bureau of Indian Affairs (BIA) administers programs to promote Tribal economic opportunity, and to protect and improve Indian Trust Assets. The BIA assisted Reclamation with the Tribal consultation, and generally served in an advisory capacity to the Tribes. Through letters of comment on the DEIS, the BIA further amplified Tribal concerns regarding Colorado River operations and the interim surplus criteria.

S.5.2.4 U.S. FISH AND WILDLIFE SERVICE INCLUDING ENDANGERED SPECIES ACT COMPLIANCE

Under Section 7(a)(2) of the Endangered Species Act (ESA), 16 U.S.C. δ 1536 (a)(2), each Federal agency must, in consultation with the Secretary (either the Secretary of Commerce through the National Marine Fisheries Service or the Secretary of the Interior through the Fish and Wildlife Service), insure that any discretionary action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat. To assist agencies in complying with the requirements of Section 7(a)(2), ESA's implementing regulations set out a detailed consultation process

for determining the biological impacts of a proposed discretionary activity. The consultation process is described in regulations promulgated at 50 C.F.R. δ 402.

Adoption of specific interim surplus criteria by the Secretary is a discretionary federal action and is therefore subject to compliance with the ESA. On May 22, 2000, Reclamation provided the Service a memorandum identifying listed or proposed species and designated critical habitat that may be present in the action area. The Service provided a response to Reclamation on June 5, 2000, which concurred with Reclamation's list and added two species: Bald Eagle and Desert Pupfish. This information was used to assess potential effects of the proposed interim surplus criteria.

Reclamation prepared a biological assessment (BA) which addresses the effects of both interim surplus criteria and the California water transfers, to reduce the consultation time frame on these two independent operational actions on the lower Colorado River. The BA and memorandum requesting formal consultation were mailed to the Service on August 31, 2000.

The action area for the BA identified above is the 100-year floodplain of the Colorado River to the SIB and the full pool elevations of Lakes Mead, Mohave and Havasu. Implementation of the interim surplus criteria is not expected to effect any listed species upriver of Lake Mead (full pool elevation) nor impact implementation of any provisions of the existing BO on the operation of Glen Canyon Dam. Within the United States, implementation of interim surplus criteria is not anticipated to effect any listed species in areas beyond the 100-year floodplain of the lower Colorado River and the full pool elevations of lakes Mead, Mohave and Havasu. Consultation with the Service is in progress and the results of the consultation will be identified in the ROD.

Preliminary evaluations of the effects of adopting interim surplus criteria on listed species which may be present in the river corridor below Glen Canyon Dam led to the conclusion that there would be no affect. More recent output, resulting from refinement of the model used to predict future dam operations and riverflows, indicated that there would be a minor change in the frequency with which flows recommended by the 1995 biological opinion would be triggered, but that such changes would not adversely affect any listed species between Glen Canyon Dam and Lake Mead. Reclamation is consulting with the Service on these changes.

Reclamation is also consulting with the Service regarding special status species in Mexico. To facilitate consultation, Reclamation prepared a supplemental biological assessment (BA) addressing the potential effects of interim surplus criteria along the Colorado River corridor in Mexico from the SIB to the Sea of Cortez. Consultation is in progress and the results of the consultation will be identified in the ROD.

S.5.2.5 NATIONAL MARINE FISHERIES SERVICE

The National Marine Fisheries Service (NMFS) administers programs that support the domestic and international conservation and management of living marine resources.

Under Section 7(a)(2) of the ESA, NMFS is the responsible Federal agency for consultation on special-status marine species. Reclamation consulted with NMFS regarding the special-status fish at the upper end of the Sea of Cortez. The consultation was facilitated by a BA supplementing the BA described in Section S.5.2.4 on the Colorado River corridor in Mexico. Consultation is in progress and the results of the consultation will be identified in the ROD.

S.5.2.6 NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires all Federal agencies to take into account the effects of their actions on historic properties, and to afford the Advisory Council on Historic Preservation (Council) a reasonable opportunity to comment when an action will have an effect on historic properties. The Council's recommended approach for consultation for the Protection of Historic Properties is found at 36 CFR 800 (FR Vol. 64, No. 95, May 18, 1999, pages 27071-27084).

The first step of the Section 106 process, as set forth at 36 CFR 800.3(a), is for the Agency Official to determine whether the proposed Federal action is an undertaking as defined in §800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects to historic properties. Reclamation has determined development and implementation of interim surplus criteria meets the definition of an undertaking, but an undertaking that is without potential to effect historic properties. Reclamation's determination and the rationale for its decision are documented in Section 3.13 of the FEIS. Per 36 CFR 800.3(a)(1), if the undertaking does not have the potential to cause effects on historic properties, the Agency Official has no further obligations under Section 106 or this part, Reclamation has fulfilled its responsibilities to take into account the effects of the development and implementation of interim surplus criteria on historic properties.

The Nevada State Historic Preservation Officer (SHPO) submitted written comments on the cultural resources section of the DEIS. The SHPO has indicated they do not agree with Reclamation's position in the DEIS that development and implementation of interim surplus criteria is an undertaking without potential to affect historic properties, and so complying with the consultation requirements of the NHPA is not necessary.

The Nevada SHPO has stated that their opportunity to comment on effects to historic properties has been precluded by Reclamation and the Department's finding, and have asked that the matter be referred to the Council. Under the implementing regulations for Section 106, when there is a disagreement between an agency and a SHPO concerning the effect of an undertaking, the matter must be referred to the Council for comment and resolution. Reclamation believes the Council will agree with the Nevada SHPO that Section 106 compliance is necessary for this proposed action. Reclamation's position is that this is not an action requiring Section 106 compliance, but more appropriately falls under Section 110 of

the NHPA. Reclamation has prepared a memorandum discussing this issue and has forwarded it to the Council for review and further consultation.

S.5.3 TRIBAL CONSULTATION

Reclamation has been coordinating river operations with the Indian Tribes and communities who have entitlements to or contracts for Colorado River water, and those that may be affected by the proposed action. Representatives of various Tribes attended the scoping meetings in May 1999, and some provided Reclamation with written comments on the proposal for interim surplus criteria. Beginning in May 1999, Reclamation has had numerous meetings with the various Tribes who have an interest in the implementation of the interim surplus criteria. The Tribes and communities fall generally into four groups: 1) the Colorado River Basin Indian Tribes (Ten Tribes Partnership) who have diversion rights from the Colorado River main stream and various tributaries; 2) the Tribes and Communities of central Arizona; 3) the Tribes in the Coachella Valley Consortium of Mission Indians; and 4) other Tribes or Indian Communities who do not have a Colorado River water entitlement but nevertheless have an interest in the availability and distribution of Colorado River water. The individual Tribes and Indian Communities in each of these groups are listed on Table S-2 at the end of this chapter.

A primary concern of the Ten Tribes Partnership was that Tribal water rights be clearly acknowledged and that the diversion point(s) for each Tribe be included in the operational model so as to more accurately reflect tribal diversions in the modeling. Other concerns included overreliance on unused Tribal water allocations by non-Tribal diverters, and Lake Powell water level fluctuations with respect to resort development opportunity. Reclamation provided financial assistance to the Ten Tribes Partnership to assist the Tribes in cataloging their Colorado River depletion rights and conducting an active coordination process with Reclamation in connection with the interim surplus criteria. Using information provided by the Tribes, Reclamation added the diversion points to the model for the FEIS.

S.5.4 STATE AND LOCAL WATER AND POWER AGENCIES COORDINATION

Since the May 18, 1999 *Federal Register* notice announcing the development of interim surplus criteria, Reclamation has had various discussions with state and local water and power agencies regarding the proposed interim surplus criteria. However, the development of surplus criteria has been the subject of discussions for many years prior to 1999. Reclamation meets regularly with representatives of the Basin States, Indian Tribes and communities, environmental organizations, and other stakeholders as part of the Colorado River Management Work Group. Reclamation coordinates the development of the Annual Operating Plan (AOP) for the Colorado River system through this group as required by federal law. It was through such coordination actions that Reclamation originally presented the alternative surplus strategies.

The Basin States provided Reclamation with projections of the future depletions of the Colorado River water anticipated by water agencies in each state. The Upper Colorado River Commission compiled Upper Basin depletions, and the Lower Division states compiled their respective depletions. The projections were used as input to Reclamation's operational modeling analysis.

Reclamation also conducted coordination with water agencies in southern California regarding the environmental documentation being prepared for various components of California's Colorado River Water Use Plan.

In the early summer of 2000, the seven Basin States acting as a group, independently from Reclamation, formulated the Seven States Proposal for interim surplus criteria which they provided to Reclamation after the DEIS was prepared. Letters of comment on the DEIS from some of the Basin States contained additional commentary on the draft proposal.

S.5.5 NON-GOVERNMENTAL ORGANIZATIONS COORDINATION

Several environmental organizations have expressed interest in the project and have attended one or more public and independent meetings with Reclamation. The Pacific Institute for Studies in Development, Environment and Security (Pacific Institute), representing a consortium of environmental organizations, submitted an interim surplus criteria proposal to Reclamation in February 2000. The proposal included an additional allocation of water to Mexico for environmental purposes. The Pacific Institute's interest in the project and coordinating role among the other environmental groups contributed to the coordination with Reclamation by various other non-governmental organizations. In addition, through the Colorado River Management Work Group, and other mechanisms, Reclamation worked with various non-governmental organizations during the NEPA process. Specifically, Reclamation met with members of the organizations noted in Table S-2 at their request to discuss environmental and technical issues.

S.5.6 MEXICO CONSULTATION

Pursuant to an international agreement for mandatory reciprocal consultations, the United States section of the IBWC (USIBWC) is consulting with Mexico regarding the proposed interim surplus criteria. Reclamation has assisted USIBWC in conducting this consultation by providing information on the proposed interim surplus criteria and by participating in briefings with the Mexico Section of the IBWC and the Mexico National Water Commission. Meetings with representatives of Mexico were conducted in April and May 2000, at which representatives of Mexico provided their concerns regarding the potential effects of the interim surplus criteria. Coordination with Mexico during the DEIS review phase has consisted of several letters from the government of Mexico and public agencies in Mexico, which are reproduced in Volume III of the DEIS.

Discussion with Mexico took place on November 14, 2000 concerning comments from Mexico. There was understanding that the consultation with Mexico through IBWC in the form of technical working groups will continue a forum for technical discussion to carry out, in the context of international comity, joint cooperation projects in support of the Colorado River riparian ecology to the Gulf of California that could have a benefit to the United States and Mexico.

Executive Order 12114 instructs Federal agencies to investigate the effects of Federal actions in other countries. Reclamation has analyzed and documented the effects of the proposed interim surplus criteria on natural resources in Mexico. This analysis will provide an analytical tool for identifying those potential impacts that extend across the international border and affect Mexico's natural and physical environment. This approach is fully consistent with CEQ guidance on NEPA analyses for transboundary impacts, dated July 1, 1997.

S.5.7 SUMMARY OF COORDINATION CONTACTS

Table S-2 lists the agencies and organizations with which Reclamation coordinated through meetings and other personal contacts during the scoping and preparation period of this FEIS.

S.5.8 FEDERAL REGISTER NOTICES

Table S-3 lists the Federal Register Notices issued to inform the public about the formulation of interim surplus criteria alternatives and the preparation and availability of the DEIS. In addition to the notices issued, notices will be provided following the publication of this FEIS to announce its availability and the Secretary's ROD based on this FEIS.

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Reservoirs Elevations and River Flows		
Lake Powell Water Surface Elevations Potential changes in Lake Powell water surface elevations.	Reservoir water levels exhibit a gradual declining trend during the interim surplus criteria period as a result of increasing Upper Division states consumptive use. The median water surface elevation in 2016 is 3665 feet msl. The probability of Lake Powell being full[3] in 2016 is 27%. After 2016, median levels stabilize, then rise and fall slightly, due to 602(a) storage requirements and less frequent equalization releases.	Median Elevations in 2016 for each of the alternatives are as follows: Basin States 3664 feet msl Flood Control 3664 feet msl Six States 3664 feet msl California 3660 feet msl Shortage Protection 3659 feet msl After 2016, Lake Powell water levels under all five alternatives tend to stabilize similar to baseline conditions. Water levels under the Basin States, Flood Control, Six States, California and Shortage Protection alternatives tend to converge with the baseline conditions by about year 2030.
Lake Mead Water Surface Elevations Potential changes in Lake Mead water surface elevations.	Reservoir water levels exhibit a gradual declining trend during the interim surplus criteria period as a result of lower Basin consumptive use exceeding long-term inflow. The median water surface elevation in 2016 is 1162 feet msl. After 2016, median water surface elevations continue to decline, although at a lower rate, due to less frequent Lower Basin surplus deliveries.	Median Elevations in 2016 for each of the alternatives are as follows: Basin States 1143 feet msl Flood Control 1162 feet msl Six States 1146 feet msl California 1131 feet msl Shortage Protection 1130 feet msl After 2016, median surface elevations continue to decline. By about 2035, all alternatives converge to elevations similar to baseline conditions.
River Flows Glen Canyon and Hoover Dam releases and flows downstream of Lake Mead.	Flows downstream of Glen Canyon Dam would be managed in accordance with the 1995 Glen Canyon Dam EIS and the 1996 ROD. Flows downstream of Hoover Dam are governed by downstream demand or Hoover Dam flood control releases.	Flood Control Alternative: Similar to baseline conditions. Other alternatives: Flows below Glen Canyon Dam would be similar to baseline conditions. Flows from Hoover Dam to Parker Dam would be moderately higher until 2016 because of surplus deliveries. After 2016, flows would be similar to baseline conditions.

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action			Effects of Alternatives[2]
Water Supply				
California Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	100% 100%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2016. The probability is similar to baseline conditions from 2017 through 2050. Deliveries less than the normal apportionment (4.4 mafy) do not occur under the alternatives at any time through 2050.
	Surplus:	2002 through 2016 2017 through 2050	47% 21%	
	Shortage:	2002 through 2016 2017 through 2050	0% 0%	
Arizona Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	>96% 50%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2016 under the California and Shortage Protection alternatives and slightly lower (26%) under the Basin States and Six States alternatives. The probability of surplus under the alternatives is about the same as baseline from 2017 to 2050. The probability of shortage condition deliveries under the alternatives is slightly higher (7% to 14%) through 2016. From 2017 to 2050, the probability of shortages under the alternatives is similar to baseline conditions.
	Surplus:	2002 through 2016 2017 through 2050	29% 21%	
	Shortage:	2002 through 2016 2017 through 2050	< 4% 50%	
Nevada Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	96% 50%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2015; same as baseline from 2017 to 2050. The probability of shortage condition deliveries is slightly higher (7% to 14%) for the alternatives through 2016. From 2017 to 2050, the probability of shortage condition deliveries is higher (3% to 5%) under the alternatives.
	Surplus:	2002 through 2016 2017 through 2050	47% 21%	
	Shortage:	2002 through 2016 2017 through 2050	< 4% 50%	
Mexico Treaty Delivery Probabilities of meeting Treaty delivery obligations.	Normal:	2002 through 2016 2017 through 2050	100% 100%	The Flood Control Alternative would provide slightly higher (1%) probabilities of surplus than under baseline conditions through 2016. The rest of the alternatives provide slightly lower (3% to 7%) probabilities of surplus through 2016 and about the same level as baseline through 2050. Deliveries less than the treaty apportionment (1.5 mafy) do not occur under the alternatives at any time through 2050.
	Surplus:	2002 through 2016 2016 through 2050	26% 19%	
	Shortage:	2002 through 2016 2017 through 2050	0% 0%	

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Water Quality		
Colorado River Salinity Potential change in salinity below Hoover Dam.	Baseline projections assume compliance with numeric criteria along the river. The Basin States are committed to meeting the numeric criteria.	Modeling indicates potential for slight reductions in salinity under each alternative as compared to baseline.
Lake Mead Water Quality and Las Vegas Water Supply Contaminant concentrations in Boulder Basin of Lake Mead, in proximity to the SNWS intakes at Saddle Island.	Increased potential for lower Lake Mead levels and increased inflow channel lengths under baseline projections could increase potential of elevated contaminant concentrations.	The alternatives, except the Flood Control Alternative, result in slightly increased potential for increased contaminant concentrations in Boulder Basin, due to greater potential for lower Lake Mead levels than under baseline conditions.
Flow-Related Issues		
Beach/Habitat-Building Flow Releases Probability of BHBF release conditions from Glen Canyon Dam.	The average annual probability of BHBF releases is 16% through 2016 and 14% from 2017 through 2050.	The probability under the alternatives is typically less than under baseline conditions during the interim period, and converges with baseline conditions thereafter.
Low Steady Summer Flows Probability of requisite conditions for low steady summer flow releases from Glen Canyon Dam.	The average annual probability of conditions requisite for low steady summer flows is 38% through 2016 and 62% from 2017 through 2050.	The probability under the alternatives is typically less than under baseline conditions during the first seven years and similar to or slightly greater than under baseline conditions thereafter.
Flooding Downstream of Hoover Dam Probability of damaging flows below Davis and Parker Dams.	Average annual probability from 2002 through 2016: Davis Dam 9% Parker Dam 10% Average annual probability from 2017 through 2050: Davis Dam 5% Parker Dam 6%	The probability under the Flood Control Alternative is slightly greater than under baseline conditions. The probability under other alternatives is slightly less than under baseline conditions.
Aquatic Resources		
Lake Habitat and Sport Fisheries Potential effects on Lake Mead and Lake Powell fisheries and associated aquatic habitat.	Species are adapted to fluctuating reservoir levels. Therefore, increased potential for lower Lake Mead and Lake Powell surface levels is not expected to adversely affect aquatic species.	Compared with baseline conditions, slightly increased potential for higher reservoir levels under the Flood Control Alternative and increased potential for lower reservoir levels under the other alternatives would not be expected to result in substantial changes to lake habitat.

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Special-Status Species		
Special-Status Plants Potential effects on special-status plants for areas influenced by Lake Powell and Lake Mead water levels.	Under baseline conditions, special-status plant species would continue to be affected by fluctuating water levels, which would periodically expose and inundate areas where the plants occur.	Although reservoir elevations would differ, the effects of all alternatives would be similar to baseline conditions.
Special-Status Wildlife Potential effects on special-status wildlife species associated primarily with potential effects on riparian habitat at the Lake Mead and Virgin River deltas, and the lower Grand Canyon.	Under baseline conditions, increased potential over time for lower reservoir levels could increase potential for development of temporary riparian habitat at the deltas, which would benefit special-status wildlife species that utilize such habitat.	The Flood Control Alternative would have slightly lower potential, while the other alternatives would have increased potential, for lower reservoir elevations and associated potential increases in delta habitat.
Special-Status Fish Potential effects of Lake Mead and Lake Powell reservoir level changes on special-status fish species.	Under baseline conditions, increased potential for lower elevations is not expected to have effects on special-status species fish different than those that occur at present.	Changes in potential for lower reservoir levels under the various alternatives would not change potential for effects.
Recreation		
Reservoir Marinas/Boat Launching Potential effects on shoreline recreation facilities from changes in Lake Mead and Lake Powell surface elevations.	Baseline condition projections indicate increased potential for reservoir levels lower than those considered within the normal operating range that some existing facilities may be able to accommodate. Such occurrence would likely result in modification of facilities to accommodate lower surface elevations.	The Flood Control Alternative has a slightly decreased potential for lower reservoir levels; each of the other alternatives have increased potential for lower levels and necessary relocations.
Reservoir Boating/Navigation Potential effects on reservoir boating that may result from changes in Lake Mead and Lake Powell surface elevations.	Baseline condition projections indicate an increased potential for the occurrence of lower Lake Mead and Lake Powell reservoir levels, which may result in potential increases in navigation hazards and decreased safe boating capacity (due to decreased reservoir surface area).	The Flood Control Alternative has slightly lower potential, and each of the other alternatives have higher potential, for each of navigation hazards and reduced carrying capacity.

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
River and Whitewater Boating Potential effects on river boating at Lake Powell and Lake Mead inflow areas.	Boaters may have reduced take-out opportunities due to increased potential for lower reservoir surface elevations.	The Flood Control Alternative has lower potential, and each of the other alternatives have increased potential, for reduced take-out opportunities resulting from lower reservoir elevations.
Reservoir Sport Fishing Potential effects on sport fishing in Lake Mead and Lake Powell.	Potential effects on sport fisheries are minimal under baseline conditions.	Changes in reservoir elevations under each of the alternatives would not be expected to adversely affect sport fisheries or fishing in either reservoir.
Recreation Facilities Relocation Costs Increased costs associated with relocating shoreline facilities to remain in operation at lower reservoir elevations.	Baseline condition projections indicate increased relocation costs associated with future increased potential for lower reservoir levels.	The Flood Control Alternative is similar to baseline conditions. Other alternatives have greater potential for increased relocation costs, based on an average cost per foot associated with relocating facilities.
Energy Resources		
Hydroelectric Power Production Potential for changes in energy production at Glen Canyon and Hoover powerplants.	Glen Canyon Powerplant average annual energy production: 4532 GWh through 2016; 4086 GWh from 2017 through 2050. Hoover Powerplant average annual energy production: 4685 GWh through 2016; 3903 GWh from 2017 through 2050.	The Flood Control Alternative is similar to baseline conditions. Average annual power production under the other alternatives is greater than under baseline conditions for the first six to eight years, then is less for the remaining years. Averaged from 2002 to 2050, Glen Canyon annual power production is from 12 to 30 GWh less than baseline conditions, while Hoover power production is from 51 to 127 GWh less.
Pumping Power Needs for SNWS Potential change in the cost of power to pump Lake Mead water through the SNWS.	Future lower average Lake Mead water levels would require more energy and increased pumping costs for the SNWS intake.	The increase over baseline conditions of annual pumping costs for each alternative follows: Basin States $229,395 Flood Control $ 32,685 Six States $214,779 California $544,843 Shortage Protection $532,635

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Intake Energy Requirements at Lake Powell Potential change in the cost of power to pump Lake Powell water to the Navajo Generating Station and the City of Page.	Future lower average Lake Powell water levels would require more energy and increased pumping costs for the Navajo Generating Station and the City of Page.	The increase over baseline conditions of annual pumping costs for each alternative follows: **Navajo Generating Station** Basin States $2,216 Flood Control $ 0 Six States $2,129 California $4,651 Shortage Protection $4,660 **City of Page** Basin States $ 529 Flood Control $ 0 Six States $ 508 California $1,110 Shortage Protection $1,112
Air Quality		
Fugitive Dust Emissions from Exposed Reservoir Shoreline Potential for fugitive dust emissions from shoreline exposure at Lake Mead and Lake Powell.	Increased potential for lower reservoir levels would increase potential for shoreline exposure under baseline conditions. Increases in fugitive dust emissions would be minimal due to low emission potential of shoreline.	Slightly decreased shoreline exposure under Flood Control Alternative would lower fugitive dust emission potential. Other alternatives would have slightly increased potential for increased fugitive dust emissions. Minimal changes in area-wide fugitive dust emissions would be expected.
Visual Resources		
Visual Attractiveness of Reservoir Scenery, Lake Mead and Lake Powell Potential effects of lower reservoir elevations on scenic quality.	Increased probability of temporary degradation in visual attractiveness of shoreline vistas resulting from increasing potential for lower water levels in Lake Mead and Lake Powell.	Flood Control Alternative: Same as baseline conditions. Other alternatives: Higher probability of degradation of visual attractiveness through 2016 due to accelerated decline of minimum reservoir levels.
Cultural Resources		
Effects on Historic Properties in Operational Zone of Reservoir and River Reaches.	Not significant due to past water level fluctuations. Impacts have already occurred.	Not significant due to past water level fluctuations. Impacts have already occurred.

Table S-1
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Indian Trust Assets		
Effects on water supply for Indian Tribes and Communities	The water available to members of Ten Tribes Partnership would not be affected by future changes under baseline conditions. There is a probability of shortages of CAP priority water for tribes in central Arizona.	No effect on water available to members of Ten Tribes Partnership. Greater probability of shortages of CAP priority water for tribes in central Arizona under all alternatives with the exception of the Flood Control Alternative.
Environmental Justice		
Exposure of Minority or Low Income Communities to Health or Environmental Hazards	No effects are anticipated.	No effects anticipated.
Transboundary Effects		
Treaty Water Delivery Obligations Probabilities of meeting Treaty delivery obligations	Normal: 2002 through 2016 100% 2017 through 2050 100% Surplus: 2002 through 2016 26% 2016 through 2050 19% Shortage: 2002 through 2016 0% 2017 through 2050 0%	The Flood Control Alternative would provide slightly higher (1%) probabilities of surplus than under baseline conditions 2016. The rest of the alternatives provide slightly lower (3% to 7%) probabilities of surpluses through 2016 and about the same level as baseline through 2050. Deliveries less than the treaty apportionment (1.5 mafy) do not occur under the alternatives at any time through 2050.
Flow Below Morelos Dam Amount of excess flow that may reach the Colorado River delta.	Probability of excess flows below Morelos Dam would gradually decline under baseline conditions.	Flood Control Alternative: Similar to baseline. Other alternatives: Small reduction in probability of excess flows.
Potential Effects on Species and Habitat in Mexico	Probability of excess flows below Morelos Dam would gradually decline.	Under the Basin States Alternative there would be no effect on desert pupfish, Vaquita, Yuma clapper rail, California black rail, Clarks grebe; and there is not likely to be any adverse affect on totoaba, Southwestern willow flycatcher, Yellow-billed cuckoo, Elf owl or Bell's vireo.

1. Effects identified are based on probabilities developed through modeling of possible future conditions through 2050, discussed in detail in Chapter 3.
2. In general, the differences between the alternatives and baseline conditions would be greatest at or near 2016, the year in which the interim surplus criteria would terminate.
3. Lake Powell is considered to be essentially full when the lake elevation reaches 3695 feet msl (5 feet below the top of the spillway gates).
4. Probabilities of shortage are based on the modeling assumption of protecting a Lake Mead elevation of 1083 feet msl. There are no established shortage criteria for the operation of Lake Mead.

Table S-2
Participants with Reclamation Regarding the Interim Surplus Criteria
Environmental Impact Statement Process

Agency or Organization Invited to or Requesting Meetings	Meetings
Federal Agencies	
National Park Service – *Cooperating Agency*	Various plan formulation and evaluation meetings
U. S. Section of the International Boundary and Water Commission – *Cooperating Agency*	Various plan formulation and evaluation meetings; Briefings for Mexico
Bureau of Indian Affairs	5/26/99, 12/15/99, 1/21/00, 2/24/00, 8/30/00
Environmental Protection Agency	6/15/99, 8/30/00
Fish And Wildlife Service	Various Consultation Meetings on ESA Compliance
National Marine Fisheries Service	Consultation on Special Status Species in the Sea of Cortez, 10/12/00
Geological Survey	6/15/99, 8/15/00
Western Area Power Administration	6/15/99, 8/15/00
Tribal Coordination – Ten Tribes Partnership	
Chemehuevi Tribe (10 Tribes member)	5/26/99, 6/15/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/4/00
Cocopah Indian Tribe (10 Tribes member)	5/26/99, 6/15/99, 111/16/1999, 2/15/99, 2/24&25/00, 8/3/00
Colorado River Indian Tribes (10 Tribes member)	5/26/99, 6/15/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/4/00
Fort Mojave Indian Tribe (10 Tribes member)	5/26/99, 6/15/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/2/00
Jicarilla Apache Tribe (10 Tribes member)	5/26/99, 11/16/1999, 12/15/99, 2/24&25/00
Navajo Nation (10 Tribes member)	5/26/99, 11/16/1999, 12/15/99, 2/24&25/00, 9/27/00, 8/3/00
Northern Ute Tribe (10 Tribes member)	5/26/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/17/00
Quechan Indian Tribe (10 Tribes member)	5/26/99, 6/15/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/2/00
Southern Ute Indian Tribe (10 Tribes member)	5/26/99, 11/16/1999, 12/15/99, 2/24&2500
Ute Mountain Ute Tribe (10 Tribes member)	5/26/99, 11/16/1999, 12/15/99, 2/24&25/00, 8/3/00

Table S-2
Participants with Reclamation Regarding the Interim Surplus Criteria Environmental Impact Statement Process

Agency or Organization Invited to or Requesting Meetings	Meetings
Tribal Coordination –Tribes And Communities In Central Arizona	
Ak-Chin Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Mojave-Apache Tribe	5/26/99, 1/21/00, 8/3/00
Gila River Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Pasqua-Yaqui Tribe	5/26/99, 1/21/00
Salt River Pima-Maricopa Indian Community	5/26/99, 6/15/99, 1/21/00
San Carlos Indian Tribe	5/26/99, 6/15/99, 1/21/00, 8/3/00
Tohono O'Odham Tribe	5/26/99, 6/15/99, 1/21/00, 8/15/00, 8/3/00
Tonto Apache Tribe	5/26/99, 6/15/99, 1/21/00, 8/4/00
Yavapai-Apache Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Yavapai-Prescott Indian Tribe	5/26/99, 6/15/99, 1/21/00
Tribal Coordination – Coachella Valley Consortium Of Mission Indians	
Agua Caliente Band of Cahuilla Indians	8/30/00, 9/6/00
Augustine Band of Mission Indians	[Contact attempted; DEIS sent]
Cabazon Band of Mission Indians	(Contact attempted; DEIS sent]
Morongo Band of Mission Indians	8/30/00
Torres-Martinez Desert Cahuilla Tribe	1/21/00, 8/30/00
Twenty-Nine Palms Band of Mission Indians	[Contact attempted; DEIS sent]
Tribal Coordination – Other Tribes	
Havasupai Indian Tribe	6/15/99, 5/26/99, 1/21/00
Hopi Tribe	6/15/99, 5/26/99, 1/21/00, 8/4/00
Hualapai Nation	6/15/99, 5/26/99, 1/21/00, 8/3/00
Kaibab Paiute Tribe	8/3/00
San Juan Southern Paiute Tribe	8/3/00
San Luis Rey Indian Water Authority	8/16/00
Zuni Indian Tribe	8/3/00

Table S-2
Participants with Reclamation Regarding the Interim Surplus Criteria
Environmental Impact Statement Process

Agency or Organization Invited to or Requesting Meetings	Meetings
State and Local Water and Power Agencies	
Arizona Department of Water Resources	6/15/99, 12/16/1999,
Central Arizona Water Conservancy District	6/15/99, 8/15/00
Coachella Valley Water District	6/15/99, 6/6/00, 8/15/00
Colorado River Board of California	6/15/99, 12/16/1999, 6/6/00, 8/15/00,11/14/00
Colorado River Commission of Nevada	6/15/99, 12/16/1999,
Colorado River Water Conservation District	8/15/00
Colorado Water Conservation Board	12/16/99, 8/15/00
Utah Division of Water Resources	12/16/99,
Imperial Irrigation District	6/15/99, 6/6/00, 8/15/00, 11/14/00
Las Vegas Valley Water District	6/22/99
Metropolitan Water District, California	6/15/99, 6/6/00, 8/15/00
New Mexico Interstate Stream Commission	12/16/99, 8/15/00
Office of the State Engineer, Wyoming	12/16/99, 8/15/00
Parker Valley Natural Resources Conservation D.	12/16/99,
Upper Colorado River Commission	6/15/99, 8/15/00
San Diego County Water Authority	8/15/00
Southern Nevada Water Authority	12/16/99, 8/15/00
Non-Governmental Agencies	
Center for Biodiversity	12/15/99, 6/8/00
Defenders of Wildlife	12/15/99, 8/15/00
Environmental Defense	12/15/99, 8/15/00
Glen Canyon Action Network	8/22/00
Pacific Institute	12/15/99, 8/15/00
Southwest Rivers	12/15/99, 8/15/00

Table S-2
Participants with Reclamation Regarding the Interim Surplus Criteria Environmental Impact Statement Process

Agency or Organization Invited to or Requesting Meetings	Meetings
International Agencies	
International Boundary and Water Commission, Mexico Section	4/12/00, 5/11&12/2000, 9/30/00, 11/9/00, 11/14/00
National Water Commission, Mexico	4/12/00, 5/11&12/2000, 9/30/00, 11/9/00, 11/14/00
National Institute of Ecology, Mexico	4/12/00, 9/30/00, 11/9/00, 11/14/00
Secretariat of Environment, Natural Resources and Fish, Mexico	9/30/00, 11/14/00

Table S-3
Federal Register Notices Regarding Interim Surplus Criteria

Notice	Title
Volume 64, No. 95, Page 27008, May 18, 1999	Intent to Solicit Comments on the Development of Surplus Criteria for Management of the Colorado River and to Initiate NEPA Process.
Volume 64, No. 103, Page 29068, May 28, 1999	Public Meetings on the Development of Surplus Criteria for Management of the Colorado River and to Initiate NEPA Process
Volume 64, No. 234, Page 68373, December 7, 1999	Colorado River Interim Surplus Criteria; Notice of Intent to Prepare an Environmental Impact Statement
Volume 65, No. 131, Page 68373, July 7, 2000	Notice of availability of a draft environmental impact statement and public hearings for the propose adoption of Colorado River Interim Surplus Criteria
Volume 65, No. 149, Page 47516, August 2, 2000	Notice of revised dates for public hearings on the proposed adoption of Colorado River Interim Surplus Criteria
Volume 65, No. 153, Page 48531, August 8, 2000	Notice of public availability of information submitted on a draft environmental impact statement for the proposed adoption of Colorado river Interim Surplus Criteria (Colorado River Basin States: Interim Surplus Guidelines – Working Draft)
Volume 65, No. 185, Page 57371, September 22, 2000	Notice of correction to published Federal Register notice of availability (Colorado River Basin States: Interim Surplus Guidelines – Working Draft)

Colorado River Interim Surplus Criteria

Final Environmental Impact Statement

Volume I

U.S. Department of the Interior
Bureau of Reclamation
December 2000

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:
LC-2502
ENV-6.00

To: All Interested Persons

Subject: Notice of Availability of the Final Environmental Impact Statement for the Colorado River Interim Surplus Criteria

Dear Sir or Madam:

Reclamation has prepared the attached Final Environmental Impact Statement (FEIS) that analyzes potential environmental impacts of adopting specific interim criteria under which surplus water conditions may be declared in the Lower Colorado River Basin during an interim period that would extend through 2016.

The interim surplus criteria would establish specific criteria to assist the Secretary of the Interior's (Secretary) annual decision-making for determining surplus conditions. They would also afford Lower Division states users, who have contracted for surplus water, a greater degree of predictability about its annual availability.

The Secretary currently makes the annual determination of water supply conditions in consultation with the Basin States, Indian Tribes, and other parties as required by Federal law. By considering various factors, including the amount of water in storage and the predicted natural runoff, the Secretary determines if there is sufficient water available in a single year to provide Arizona, California, and Nevada water users more than their basic 7.5 million acre-foot entitlement for consumptive use. If the determination is made that this water is available, the Secretary can make it available to users in these three states as "surplus" water, under provisions of applicable federal law.

The FEIS presents five possible action alternatives for implementation, plus a "no action" alternative. The FEIS includes a preferred alternative. The five potential action alternatives are: (1) "Flood Control Alternative," which would provide surplus water only when flood control releases from Lake Mead are needed, (2) "Basin States Alternative" (Preferred Alternative), (3) "Six States Alternative," (4) "California Alternative," all which specify various Lake Mead water surface elevations to be used as "triggers" to indicate when surplus conditions exist and (5) "Shortage Protection Alternative," which is based on maintaining an amount of water in Lake Mead necessary to provide a normal annual supply of 7.5 maf for the Lower Division, 1.5 maf for Mexico, and storage necessary to provide an 80 percent protection for the critical Lake Mead water elevation of 1083 msl (minimum power generation elevation).

The FEIS is available on the Internet at **http://www.lc.usbr.gov** and **http://www.uc.usbr.gov.** Copies (including compact disks) of the FEIS are also available upon written request to the following address: Ms. Janet Steele, Attention: BCOO-4601, PO Box 61470, Boulder City, Nevada 89006-1470, Telephone: 702-293-8551, or by fax at 702-293-8042.

If you have any further questions, please contact Ms. Jayne Harkins at 702-293-8785 or Mr. Tom Ryan at 801-524-3732.

Sincerely,

Robert W. Johnson
Regional Director ACTING FOR

Enclosure

Environmental Impact Statement **Draft ( )** **Final (X)**

Lead Agency: United States Department of Interior
Bureau of Reclamation, Lower Colorado Region
Boulder City, Nevada

Cooperating Agencies: United States Department of the Interior
National Park Service
International Boundary and Water Commission,
United States and Mexico, United States Section

1. Abstract:

The Secretary of the Interior (Secretary), acting through the U.S. Bureau of Reclamation (Reclamation), is considering the adoption of specific interim surplus criteria to determine the conditions under which surplus water would be available for use in Arizona, California and Nevada over the next 15 years (from 2002 through 2016). This Final Environmental Impact Statement (FEIS) has been prepared pursuant to the National Environmental Policy Act (NEPA) to address the formulation and evaluation of specific interim surplus criteria and to identify the potential environmental impacts of implementing such criteria.

2. For further information, contact:

Ms. Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
PO Box 61470
Boulder City NV 89006-1470
(702) 293-8785

Mr. Tom Ryan, UC-438
Upper Colorado Regional Office
Bureau of Reclamation
125 South State Street
Salt Lake City UT 84138
(801) 524-3732

Statement Number: FES 00-52
Filing Date: December 8, 2000

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Local Agencies

State Agencies

Tribes

Federal Agencies

Mexican Agencies/Organizations

Additional Tribe

Oral Comments

[1]This letter was submitted by the following organizations:

Defenders of Wildlife
Environmental Defense
El Centro de Derecho Ambiental e Integracion Economica del Sur, A.C.
Friends of Arizona Rivers
Glen Canyon Action Network
Glen Canyon Institute
Pacific Institute for Studies in Development, Environment and Security
Sierra Club
Fred Cagle
Jaqueline Garcia-Hernandez

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EXECUTIVE SUMMARY

ACRONYMS AND ABBREVIATIONS

4.4 Plan	California 4.4 Plan
AAC	All-American Canal
AAQS	ambient air quality standards
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
af	acre-feet
afy	acre-feet per year
AGFD	Arizona Game and Fish Department
ALP	Animas-La Plata Project
AMP	Glen Canyon Dam Adaptive Management Program
AMWG	Adaptive Management Work Group
AOP	Annual Operating Plan
APE	Area of Potential Effect
AWBA	Arizona Water Banking Authority
BA	Biological Assessment
Basin States	Colorado River Basin States
BCO	Biological and Conference Opinion
BCPA	Boulder Canyon Project Act of 1928
BHBF	Beach/Habitat-Building Flow
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMI	Basic Management, Inc.
BO	Biological Opinion
°C	degrees Celsius
CAP	Central Arizona Project
CA PLAN	California's Colorado River Water Use Plan
CAWCD	Central Arizona Water Conservation District
CBRFC	Colorado Basin River Forecast Center
CDFG	Colorado Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
Clean Water Act	Federal Water Pollution Control Act
the Compact	Colorado River Compact of 1992
Corps	United States Army Corps of Engineers
Council	Advisory Council on Historic Preservation
Court	United States Supreme Court
CRBPA	Colorado River Basin Project Act of 1968
CRFWLS	Colorado River Front Work and Levee System
CRIR	Colorado River Indian Reservation
CRIT	Colorado River Indian Tribes
CRMWG	Colorado River Management Work Group
CRSP	Colorado River Storage Project

CRSPA	Colorado River Storage Project Act of 1956
CRSS	Colorado River Simulation System
CRSSez	A simplified version of CRSS
CUP	Central Utah Project
CVWD	Coachella Valley Water District
Decree	The 1964 U. S. Supreme Court Decree, *Arizona v. California*
DEIS	Draft Environmental Impact Statement
DO	dissolved oxygen
DOE	United States Department of Energy
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
°F	degrees Fahrenheit
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
Forum	Colorado River Basin Salinity Control Forum
FWCA	Fish and Wildlife Coordination Act of 1934
GCNRA	Glen Canyon National Recreation Area
GRIC	Gila River Indian Community
Gulf	Gulf of California
GWh	gigawatt-hour
HAVFISH	Lake Havasu Fishery Improvement Project
HCP	Habitat Conservation Plan
IBWC	International Boundary and Water Commission United States and Mexico
IID	Imperial Irrigation District
Indian	American Indian
Interior	U.S. Department of the Interior
ISM	Indexed Sequential Method
ITA	Indian Trust Asset
kaf	thousand acre-feet
kV	kilovolt(s)
LCRAS	Lower Colorado River Accounting System
LCRMSCP	Lower Colorado River Multi-Species Conservation Program
LMNRA	Lake Mead National Recreation Area
LROC	Long-Range Operating Criteria
LVWCC	Las Vegas Wash Coordination Committee
LVWCAMP	Las Vegas Wash Comprehensive Adaptive Management Plan
M&I	municipal and industrial
maf	million acre-feet
mafy	million acre-feet per year
Mexico	United Mexican States
µg/g	micrograms per gram
µg/l	microgram per liter
mg/l	milligram per liter
mg/m^3	milligrams per cubic meter

MOA	Memorandum of Agreement
MOC	Memorandum of Clarification
MODE	Main Outlet Drain Extension
MOU	Memorandum of Understanding
mph	miles per hour
MSCP	Multi-Species Conservation Program
msl	mean sea level
MW	megawatts
MWD	Metropolitan Water District of Southern California
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act of 1969, as amended
NFWG	Native Fish Work Group
NHPA	National Historic Preservation Act of 1966
NHWZ	New High Water Zone
NIB	Northerly International Boundary
NIIP	Navajo Indian Irrigation Project
NMFS	National Marine Fisheries Service
NPS	National Park Service
NWR	National Wildlife Refuge
O&M	operation and maintenance
Pacific Institute	Pacific Institute for Studies in Development Environment and Security
P.L.	Public Law
PM	particulate matter
ppb	parts per billion
ppm	parts per million
PPR	present perfected rights
PVID	Palo Verde Irrigation District
Reclamation	United States Bureau of Reclamation
RM	river mile
RMP	Resource Management Plan
ROD	Record of Decision
San Carlos	San Carlos Apache Tribe
SCP	Colorado River Basin Salinity Control Program
SDCWA	San Diego County Water Authority
SDWA	Safe Drinking Water Act of 1974
Secretary	United States Secretary of the Interior
Section 7	Section 7 of the Federal Endangered Species Act
Section 10	Section 10 of the Federal Endangered Species Act
Service	United States Fish and Wildlife Service
SHPO	State Historic Preservation Officer
SIB	Southerly International Boundary
SLD	Shoreline Development Value
SNWA	Southern Nevada Water Authority
SNWS	Southern Nevada Water System

SRPMIC	Salt River Pima Maricopa Indian Community
SWP	California State Water Project
TDS	total dissolved solids
Treaty	U.S.-Mexico Water Treaty of 1944
UIIP	Uintah Indian Irrigation Project
Umho/cm^2	micromhos per centimeter squared
USGS	United States Geological Survey
USIBWC	United States Section of the International Boundary and Water Commission
Western	Western Area Power Administration
WSCC	Western States Coordinating Council

CHAPTER ONE

INTRODUCTION

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The Secretary of the United States Department of the Interior (Secretary), acting through the United States Bureau of Reclamation (Reclamation), is considering the adoption of specific interim criteria under which surplus water conditions may be declared in the lower Colorado River Basin during a 15-year period that would extend through 2016.

The Secretary is vested with the responsibility of managing the mainstream waters of the lower Colorado River pursuant to applicable federal law. This responsibility is carried out consistent with a collection of documents known as the *Law of the River*, which includes a combination of federal and state statutes, interstate compacts, court decisions and decrees, an international treaty, contracts with the Secretary, operating criteria, regulations and administrative decisions (see Section 1.3.2.1 for a further discussion of the *Law of the River*).

The long-term Colorado River system management objectives are to:

- Minimize flood damages from river flows,
- Release water only in accordance with the 1964 Decree in *Arizona v. California* (Decree),
- Protect and enhance the environmental resources of the basin,
- Provide reliable delivery of water for beneficial consumptive use,
- Increase flexibility of water deliveries under a complex allocation system,
- Encourage efficient use of renewable water supplies,
- Minimize curtailment to users who depend on such supplies, and
- Consider power generation needs.

As the agency that is designated to act on the Secretary's behalf with respect to these matters, Reclamation is the Lead Federal Agency for the purposes of NEPA compliance for the development and implementation of the proposed interim surplus criteria. The National Park Service (NPS) and the United States Section of the International Boundary and Water Commission (USIBWC) are cooperating agencies for purposes of assisting with the environmental analysis.

This Final Environmental Impact Statement (FEIS) has been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended, and the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural

Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508). This FEIS has been prepared to address the formulation and evaluation of specific interim surplus criteria and to identify the potential environmental effects of implementing such criteria.

This FEIS addresses the environmental issues associated with, and analyzes the environmental consequences of various alternatives for specific interim surplus criteria. The alternatives addressed in this FEIS are those Reclamation has determined would meet the purpose and need for the federal action and represent a broad range of the most reasonable alternatives.

1.1.1 PROPOSED FEDERAL ACTION

The proposed federal action is the adoption of specific interim surplus criteria pursuant to Article III(3)(b) of the *Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968* (Long-Range Operating Criteria [LROC]). The interim surplus criteria would be used annually to determine the conditions under which the Secretary may declare the availability of surplus water for use within the states of Arizona, California and Nevada. The criteria must be consistent with both the Decree entered by the United States Supreme Court in 1964 in the case of *Arizona v. California* and the LROC. The interim surplus criteria would remain in effect for determinations made through calendar year 2015 regarding the availability of surplus water through calendar year 2016, subject to five-year reviews conducted concurrently with LROC reviews, and would be applied each year as part of the Annual Operating Plan (AOP).

1.1.2 BACKGROUND

Pursuant to Article II(B)2 of the Decree, if there exists sufficient water available in a single year for pumping or release from Lake Mead to satisfy annual consumptive use in the States of California, Nevada, and Arizona in excess of 7.5 million acre-feet (maf), such water may be determined by the Secretary to be available as “surplus” water. The Secretary is authorized to determine the conditions upon which such water may be made available. The Colorado River Basin Project Act of 1968 (CRBPA) directs the Secretary to adopt criteria for coordinated long-range operation of reservoirs on the Colorado River in order to comply with and carry out the provisions of the Colorado River Compact of 1922 (Compact), the Colorado River Storage Project Act of 1956 (CRSPA), the Boulder Canyon Project Act of 1928 (BCPA) and the United States-Mexico Water Treaty of 1944 (Treaty). These criteria are the LROC, described in detail later in this chapter and reproduced in Attachment A. The Secretary sponsors a formal review of the LROC every five years.

The LROC provide that the Secretary will determine the extent to which the reasonable consumptive use requirements of mainstream users in Arizona, California and Nevada (the Lower Division states) can be met. The LROC define a normal year as a year in

which annual pumping and release from Lake Mead will be sufficient to satisfy 7.5 maf of consumptive use in accordance with the Decree. A surplus year is defined as a year in which water in quantities greater than normal (i.e., greater than 7.5 maf) is available for pumping or release from Lake Mead pursuant to Article II(B)2 of the Decree after consideration of relevant factors, including the factors listed in the LROC. Surplus water is available to agencies which have contracted with the Secretary for delivery of surplus water, for use when their water demand exceeds their basic entitlement, and when the excess demand cannot be met within the basic apportionment of their state. Water apportioned to, but unused by one or more Lower Division states can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division states as provided in Article II(B)(6) of the Decree.

Pursuant to the CRBPA, the LROC are utilized by the Secretary, on an annual basis, to make determinations with respect to the projected plan of operations of the storage reservoirs in the Colorado River Basin. The AOP is prepared by Reclamation, acting on behalf of the Secretary, in consultation with representatives of the Colorado River Basin states (Basin States) and other parties, as required by federal law. The interim surplus criteria would serve to implement the provisions of Article III(3)(b) of the LROC on an annual basis in the determinations made by the Secretary as part of the AOP process.

1.1.3 PURPOSE OF AND NEED FOR ACTION

To date, the Secretary has applied factors, including but not limited to those found in Article III(3)(b)(i-iv) of the LROC, in annual determinations of the availability of surplus quantities of water for pumping or release from Lake Mead. As a result of actual operating experience and through preparation of AOPs, particularly during recent years when there has been increasing demand for surplus water, the Secretary has determined that there is a need for more specific surplus criteria, consistent with the Decree and applicable federal law, to assist in the Secretary's annual decision making during an interim period.

For many years, California has been diverting more than its normal 4.4 maf apportionment. Prior to 1996, California utilized unused apportionments of other Lower Division states that were made available by the Secretary. Since 1996, California has also utilized surplus water made available by Secretarial determination. California is in the process of developing the means to reduce its annual use of Colorado River water to 4.4 maf. Arizona is approaching full use of its apportionment and Nevada was expected to reach its apportionment in 2000.

Additionally, through adoption of specific interim surplus criteria, the Secretary will be able to afford mainstream users of Colorado River water, particularly those in California who currently utilize surplus flows, a greater degree of predictability with respect to the likely existence, or lack thereof, of surplus conditions on the river in a given year. Adoption of the interim surplus criteria is intended to recognize California's plan to reduce reliance on surplus deliveries, to assist California in moving

toward its allocated share of Colorado River water, and to avoid hindering such efforts. Implementation of interim surplus criteria would take into account progress, or lack thereof, in California's efforts to achieve these objectives. The surplus criteria would be used to identify the specific amount of surplus water which may be made available in a given year, based upon factors such as the elevation of Lake Mead, during a period within which demand for surplus Colorado River water will be reduced. The increased level of predictability with respect to the prospective existence and quantity of surplus water would assist in planning and operations by all entities that receive surplus Colorado River water pursuant to contracts with the Secretary.

1.1.4 RELATIONSHIP TO THE UNITED STATES-MEXICO WATER TREATY

Under Article 10(a) of the Treaty, the United Mexican States (Mexico) is entitled to an annual amount of 1.5 maf of Colorado River water. Under Article 10(b) of the Treaty, Mexico may schedule up to an additional 0.2 maf when "there exists a surplus of waters of the Colorado River in excess of the amount necessary to satisfy uses in the United States." This is in addition to surplus determinations for the Lower Division states made pursuant to Article II(2)(b) of the Decree and Article III(3)(B) of the LROC. The proposed action is not intended to identify, or change in any manner, conditions when Mexico may schedule this additional 0.2 maf. Under current practice, surplus declarations under the Treaty for Mexico are declared when flood control releases are made. Modeling assumptions used in this EIS are based upon this practice. Reclamation is currently engaged in discussions with Mexico through the IBWC on the effects of the proposed action.

1.1.5 LEAD AND COOPERATING AGENCIES

The Secretary is vested with the responsibility of managing the mainstream waters of the lower Colorado River pursuant to federal law. This responsibility is carried out consistent with the *Law of the River*. Reclamation, as the agency that is designated to act on the Secretary's behalf with respect to these matters, is the Lead Federal Agency for the purposes of NEPA compliance for the development and implementation of the proposed interim surplus criteria.

The NPS and the USIBWC are cooperating agencies for purposes of assisting with the environmental analysis. The NPS administers three areas of national significance along the Colorado River: Glen Canyon National Recreation Area (GCNRA), Grand Canyon National Park and Lake Mead National Recreation Area (LMNRA). The NPS administers recreation, cultural and natural resources in these areas from offices at Page and Grand Canyon National Park, Arizona and Boulder City, Nevada, respectively. The NPS also grants and administers concessions for the operation of marinas and other recreation facilities at Lake Powell and Lake Mead.

The International Boundary and Water Commission United States and Mexico (IBWC) is a bi-national organization responsible for administration of the provisions of the Treaty, including the Colorado River waters allocated to Mexico, protection of lands along the Colorado River from floods by levee and floodway projects, resolution of international boundary water sanitation and other water quality problems, and preservation of the river as the international boundary. The IBWC consists of the United States Section and the Mexico Section, which have their headquarters in the adjoining cities of El Paso, Texas and Ciudad Juarez, Chihuahua, respectively.

1.2 SUMMARY OF CONTENTS OF THIS FEIS

Following is a brief description of the topics presented in the three volumes that comprise this FEIS, including a summary of the chapters in Volume I.

Volume I of this FEIS (this volume) describes the proposed action, the alternatives considered, the analysis of potential effects of interim surplus criteria on Colorado River operation and associated resources, and environmental commitments associated with the action alternatives. The contents of the chapters in this volume are as follows:

Chapter 1, Introduction, includes the following: identification of the purpose of and need for the interim surplus criteria being considered; background information concerning the apportionment of Colorado River water and the physical facilities associated with the Colorado River system; and discussion of the institutional framework within which the river system is managed. Chapter 1 also discusses previous and ongoing actions that have a relationship to the proposed interim surplus criteria.

Chapter 2, Description of Alternatives, describes the process of formulating alternatives and presents the reservoir operation strategies of each alternative under consideration. A summary table of potential environmental consequences of action alternatives is provided at the end of Chapter 2.

Chapter 3, Affected Environment and Environmental Consequences, presents the analysis of baseline conditions along with potential impacts that could result from implementation of the interim surplus criteria alternatives under consideration. The discussion addresses both the affected environment (existing conditions within the area of potential effect) and environmental consequences (potential effects of the interim surplus criteria alternatives that could occur as compared to baseline projections). Also discussed, in Section 3.17, are environmental commitments that Reclamation would undertake if interim surplus criteria are implemented.

Chapter 4, Other NEPA Considerations, discusses cumulative impacts, the relationship between short-term use and long-term productivity, and irreversible and irretrievable commitments of resources affected by the interim surplus criteria under consideration.

Chapter 5, Consultation and Coordination, describes the public involvement process, including public notices, scoping meetings, and hearings. This chapter also describes the coordination with federal and state agencies, Indian Tribes, and Mexico during the preparation of this document and any permitting or approvals that may be necessary for implementation of proposed interim surplus criteria.

In addition to the above, Volume I includes a list of acronyms used throughout this document, a glossary of commonly used terms, a list of references cited in the FEIS, a list of persons contributing to the preparation of the FEIS, a distribution list of agencies, organizations and persons receiving copies of the document, and an index.

Volume II contains attachments which are comprised of documents and other supporting material that provide detailed historical background and/or technical information concerning this proposed action.

Volume III contains reproductions of letters from the public resulting from the public review of the Draft Environmental Impact Statement (DEIS) and Reclamation's responses to the comments received.

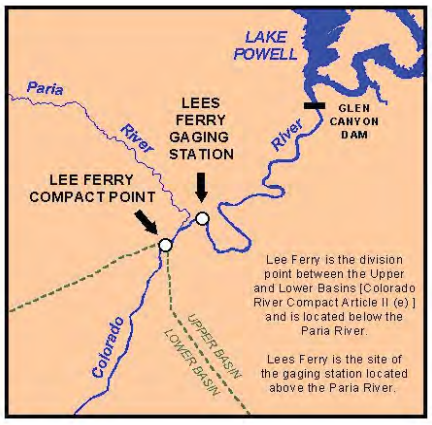
1.3 WATER SUPPLY MANAGEMENT AND ALLOCATION

This section summarizes the water supply available in the Colorado River Basin from natural runoff, its distribution under the *Law of the River*, and the reservoirs and diversion facilities through which the water supply is administered from Lake Powell to Mexico.

1.3.1 COLORADO RIVER SYSTEM WATER SUPPLY

The Colorado River serves as a source of water for irrigation, domestic and other uses in the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming and in Mexico. The Colorado River also serves as a source of water for a variety of recreational and environmental benefits.

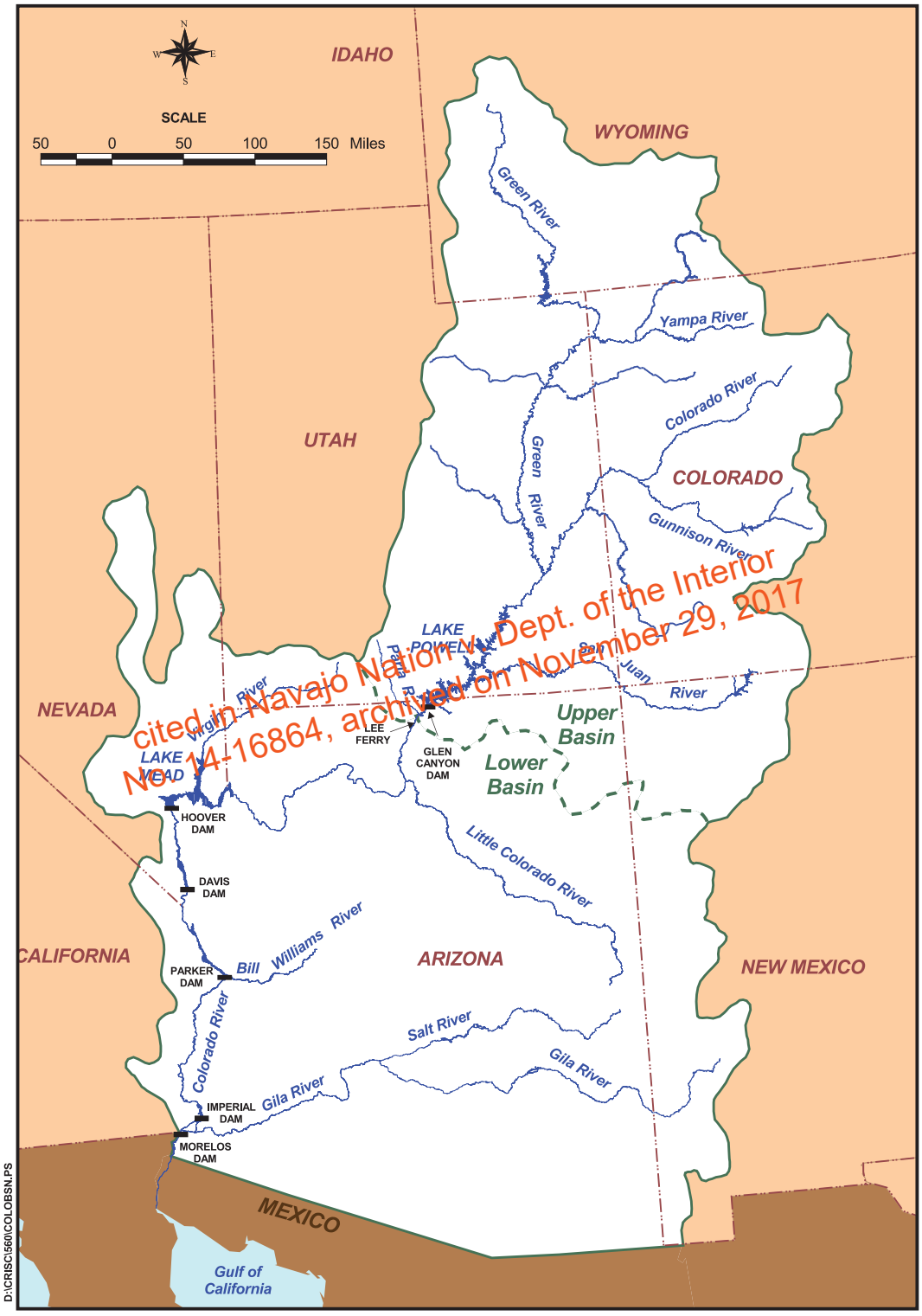
Figure 1-1
Locations of Lee Ferry and Lees Ferry



The Colorado River Basin is located in the southwestern United States, as shown on Map 1-1, and occupies a total area of approximately 250,000 square miles. The Colorado River is approximately 1400 miles in length and originates along the Continental Divide in Rocky Mountain National Park in Colorado. Elevations in the Colorado River Basin range from sea level to over 14,000 feet above mean sea level (msl) in the mountainous headwaters.

Climate varies significantly throughout the Colorado River Basin. Most of the Basin is comprised of desert

Map 1-1 Colorado River Drainage Basin



or semi-arid rangelands, which generally receive less than 10 inches of precipitation per year. In contrast, many of the mountainous areas that rim the northern portion of the Basin receive, on average, over 40 inches of precipitation per year.

Most of the total annual flow in the Colorado River Basin is a result of natural runoff from mountain snowmelt. Because of this, natural flow is very high in the late spring and early summer, diminishing rapidly by mid-summer. While flows in late summer through autumn sometimes increase following rain events, natural flow in the late summer through winter is generally low. Major tributaries to the Colorado River include the Green, San Juan, Yampa, Gunnison and Gila Rivers.

The annual flow of the Colorado River varies considerably from year to year. The natural flow at the Lees Ferry gaging station (see Figure 1-1), located 17 river miles (RMs) below Glen Canyon Dam, has varied annually, from 5 maf to 23 maf. Natural flow represents an estimate of flows that would exist without reservoir regulation, depletion, or transbasin diversion by man.

Most of the lower Colorado River's water, or about 88 percent of the annual natural supply, flows into the Lower Basin from the Upper Basin and is accounted for at Lee Ferry, Arizona. The remaining 12 percent of the lower Colorado River's water is attributed to sidewash inflows due to rainstorms and tributary rivers in the Lower Basin. The Lower Colorado River Basin's mean annual tributary inflow is about 1.38 maf, excluding the intermittent Gila River inflow. Actual tributary inflows are highly variable from year to year.

1.3.2 APPORTIONMENT OF WATER SUPPLY

This section summarizes the Colorado River apportionments of the Basin States and Mexico stemming from the *Law of the River*, past and current river diversions and consumptive use and projected future depletions. The apportionments of the Basin States are stipulated in terms of consumptive use, which consists of diversions minus return flows to the river system.

1.3.2.1 THE *LAW OF THE RIVER*

As stated previously, the Secretary is vested with the responsibility to manage the mainstream waters of the lower Colorado River pursuant to applicable federal law. The responsibility is carried out consistent with a body of documents referred to as the *Law of the River*. The *Law of the River* encompasses numerous operating criteria, regulations and administrative decisions included in federal and state statutes, interstate compacts, court decisions and decrees, an international treaty, and contracts with the Secretary.

Particularly notable among these documents are:

1) The Colorado River Compact of 1922, which apportioned beneficial consumptive use of water among the Upper and Lower Basins; The Boulder Canyon Project Act of 1928 (BCPA), which authorized construction of Hoover Dam and the All-American Canal (AAC), also authorized the Lower Division states to enter into an agreement apportioning the water, required that water users in the Lower Basin have a contract with the Secretary, and established the responsibilities of the Secretary to direct, manage and coordinate the operation of Colorado River dams and related works in the Lower Basin;

2) The California Seven Party Water Agreement of 1931, which established the relative priorities of rights among major users of Colorado River water in California who claimed rights at that time;

3) The United States-Mexico Water Treaty of 1944 and subsequent specific applications through minutes of the IBWC related to the quantity and quality of Colorado River water delivered to Mexico;

4) The Upper Colorado River Basin Compact of 1948, which apportioned the Upper Basin water supply;

5) The Colorado River Storage Project Act of 1956 (CRSPA), which authorized a comprehensive water development plan for the Upper Basin that included the construction of Glen Canyon Dam;

6) The 1964 United States Supreme Court Decree, *Arizona v. California* (Decree), which confirmed the apportionment of the Lower Basin tributaries was reserved for the exclusive use of the states in which the tributaries are located; confirmed the Lower Basin mainstem apportionments of 4.4 maf for use in California, 2.8 maf for use in Arizona and 0.3 maf for use in Nevada; addressed the reservation of water for American Indian (Indian) reservations and other federal reservations in California, Arizona and Nevada; and confirmed the significant role of the Secretary in managing the mainstream of the Colorado River within the Lower Basin;

7) The Colorado River Basin Project Act of 1968,which authorized construction of a number of water development projects including the Central Arizona Project (CAP) and required the Secretary to develop the LROC;

8) The Colorado River Basin Salinity Control Act of 1974, which authorized a number of salinity control projects and provided a framework to improve and meet salinity standards for the Colorado River in the United States and Mexico; and

9) The Grand Canyon Protection Act of 1992, which addressed the protection of resources in Grand Canyon National Park and Glen Canyon National Recreation Area.

Documents which are generally considered as part of the *Law of the River* include, but are not limited to, documents listed in Table 1-1. Among other provisions of applicable federal law, NEPA and the Endangered Species Act (ESA) provide a statutory overlay on certain actions taken by the Secretary. For example, as noted in Section 1.1, preparation of this FEIS has been undertaken pursuant to NEPA.

1.3.2.2 APPORTIONMENT PROVISIONS

The initial apportionment of water from the Colorado River was determined as part of the 1922 Colorado River Compact. The Compact divided the Colorado River into two sub-basins, the Upper Basin and the Lower Basin (see Map 1-2). The Upper Basin includes those parts of the States of Colorado, Utah, Wyoming, Arizona and New Mexico within and from which waters drain naturally into the Colorado River above Lee Ferry (Arizona). The Lower Basin includes those parts of the States of Arizona, California, Nevada, New Mexico and Utah within and from which waters naturally drain into the Colorado River system below Lee Ferry (Arizona). The Compact also divided the seven Basin States into the Upper Division and the Lower Division (see Map 1-3). The Upper Division consists of the states of Wyoming, Utah, Colorado and New Mexico. The Lower Division consists of the states of Arizona, California and Nevada.

Map 1-2
Upper and Lower Basins of the Colorado River

Table 1-1
Documents Included in the Law of the River

The River and Harbor Act, March 3, 1899

The Reclamation Act of June 17, 1902

Reclamation of Indian Lands in Yuma, Colorado River and Pyramid Lake Indian Reservations Act of April 21, 1904

Yuma Project authorized by the Secretary of the Interior on May 10, 1904, pursuant to Section 4 of the Reclamation Act of June 17, 1902

Warren Act of February 21, 1910

Protection of Property Along the Colorado River Act of June 25, 1910

Patents and Water-Right Certificates Acts of August 9, 1912 and August 26, 1912

Yuma Auxiliary Project Act of January 25, 1917

Availability of Money for Yuma Auxiliary Project Act of February 11, 1918

Sale of Water for Miscellaneous Purposes Act of February 25, 1920

Federal Power Act of June 10, 1920

The Colorado River Compact of November 24, 1922

The Colorado River Front Work and Levee System Acts of March 3, 1925 and January 21,1927-June 28, 1946

The Boulder Canyon Project Act of December 21, 1928

The California Limitation Act of March 4, 1929

The California Seven Party Agreement of August 18, 1931

The Parker and Grand Coulee Dams Authorization of August 30, 1935

The Parker Dam Power Project Appropriation Act of May 2, 1939

The Reclamation Project Act of August 4, 1939

The Boulder Canyon Project Adjustment Act of July 19, 1940

The Flood Control Act of December 22, 1944

United States-Mexico Water Treaty of February 3, 1944

Gila Project Act of July 30, 1947

The Upper Colorado River Basin Compact of October 11, 1948

Consolidated Parker Dam Power Project and Davis Dam Project Act of May 28, 1954

Palo Verde Diversion Dam Act of August 31, 1954

Change Boundaries, Yuma Auxiliary Project Act of February 15, 1956

The Colorado River Storage Project Act of April 11, 1956

Water Supply Act of July 3, 1958

Boulder City Act of September 2, 1958

Report of the Special Master, Simon H. Rifkind, *Arizona v. California*, et al., December 5, 1960

United States Supreme Court Decree, *Arizona v. California*, March 9, 1964

International Flood Control Measures, Lower Colorado River Act of August 10, 1964

Southern Nevada (Robert B. Griffith) Water Project Act of October 22, 1965

The Colorado River Basin Project Act of September 30, 1968

Criteria for the Coordinated Long Range Operation of Colorado River Reservoirs, June 8, 1970

Supplemental Irrigation Facilities, Yuma Division Act of September 25, 1970

Minutes 218, March 22, 1965; 241, July 14, 1972, (replaced 218), and 242, August 30, 1973, (replaced 241) of the International Boundary and Water Commission, pursuant to the United States-Mexico Water Treaty of 1944

The Colorado River Basin Salinity Control Act of June 24, 1974

United States Supreme Court Supplemental Decrees, *Arizona v. California*, January 9, 1979 and April 16, 1984

Hoover Power Plant Act of August 17, 1984

The Numerous Colorado River Water Delivery and Project Repayment Contracts with the States of Arizona and Nevada, cities, water districts and individuals

Hoover and Parker-Davis Power Marketing Contracts

Reclamation States Emergency Drought Relief Act of 1991

Grand Canyon Protection Act of October 30, 1992

43 CFR 414 Offstream Storage of Colorado River Water in the Lower Division States

43 CFR 417 Lower Basin Water Conservation Measures

The Compact apportioned to each Basin, in perpetuity, the exclusive beneficial consumptive use of 7.5 maf of water per year. In addition to this apportionment, Article III(b) gives the Lower Basin the right to increase its beneficial consumptive use by 1.0 maf per annum. The Compact also stipulates in Article III(d) that the states of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75 maf for any period of 10 consecutive years.

Map 1-3
Upper and Lower Division States of the Colorado River

The Compact, in Article VII, states that nothing in the Compact shall be construed as affecting the obligations of the United States to Indian Tribes. While the rights of most tribes to Colorado River water were subsequently adjudicated, some Tribal rights remain unadjudicated.

1.3.2.2.1 Upper Division State Apportionments

The Compact apportioned 7.5 maf of water in perpetuity to the Upper Basin. The Upper Basin Compact apportioned among the four Upper Division states the following percentages of the total quantity of consumptive use apportioned to and available for use each year by the Upper Basin under the Upper Colorado River Basin Compact and remaining after deduction of the use, not to exceed 50,000 acre-feet (af) per annum, made in the State of Arizona:

- Wyoming 14.00 percent
- Utah 23.00 percent
- Colorado 51.75 percent
- New Mexico 11.25 percent

In 1988, a determination of Upper Basin water supply was made in *Hydrologic Determination: Water Availability from Navajo Reservoir and the Upper Colorado River Basin for Use in New Mexico* (Interior, 1989). In consideration of Article 3(d) of the Compact and accounting for the decrease in the average natural flow of the Colorado River since the signing of the Compact in 1922, the Determination concluded that Upper Basin annual water depletion can reasonably be expected to reach six maf.

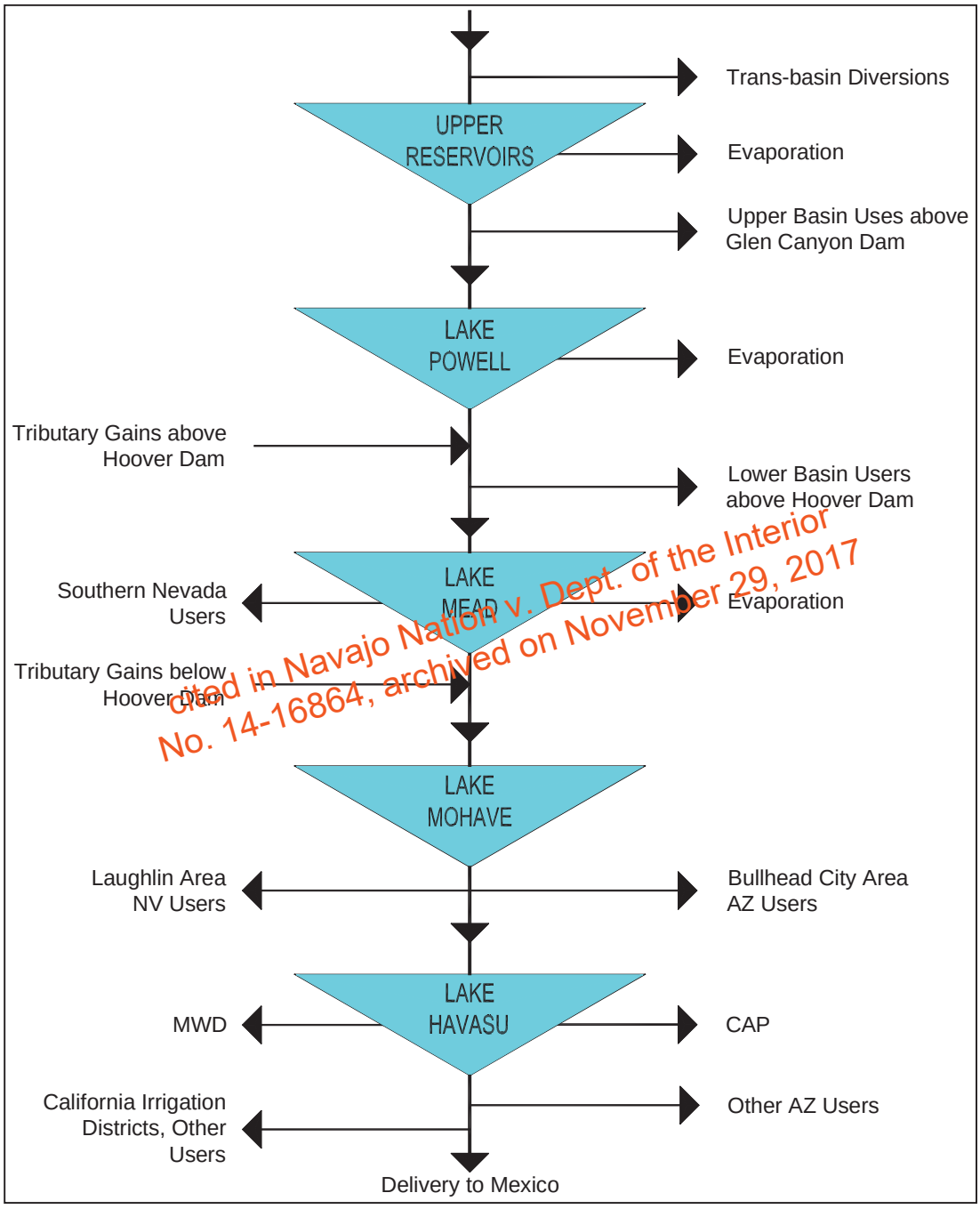
1.3.2.2.2 Lower Division State Apportionments

If sufficient mainstream water is available for release, as determined by the Secretary, to satisfy 7.5 maf of consumptive use in the Lower Division states, then the amount of Colorado River water apportioned for consumptive use in each Lower Division state is expressed in terms of a fixed amount in each state, subject to varying provisions at times of surpluses or shortages. These apportionments are: California, 4.4 maf; Arizona, 2.8 maf; and Nevada, 0.3 maf, totaling 7.5 maf. Figure 1-2 presents a schematic of the operation of the Colorado River, primarily in the Lower Basin. The apportionments to the Lower Division states were established by the BCPA and confirmed by the Decree. If water apportioned for use in a Lower Division state is not consumed by that state in any year, the Secretary may release the unused water for use in another Lower Division state. Consumptive use by a Lower Division state includes delivered water that is stored offstream for future use by that state or another state.

All mainstream Colorado River waters apportioned to the Lower Basin, except for a few thousand af apportioned for use in the State of Arizona, have been fully allocated to specific entities and, except for certain federal establishments, placed under permanent water delivery contracts with the Secretary for irrigation or domestic use. These entities include irrigation districts, water districts, municipalities, Indian Tribes, public institutions, private water companies and individuals. Federal establishments with federal reserved rights established pursuant to Article II(D) of the Decree are not required to have a contract with the Secretary, but the water allocated to a federal establishment is included within the apportionment of the Lower Division state in which the federal establishment is located.

The highest priority Colorado River water rights are present perfected rights (PPRs), which the Decree defines as those perfected rights existing on June 25, 1929, the effective date of the BCPA. The Decree also recognizes Federal Indian reserved rights for the quantity of water necessary to irrigate all the practicably irrigable acreage on five Indian reservations along the lower Colorado River. The Decree defines the rights of Indian and other federal reservations to be federal establishment PPRs. PPRs are important because in any year in which less than 7.5 maf of Colorado River water is available for consumptive use in the Lower Division states, PPRs will be satisfied first, in the order of their priority without regard to state lines.

Figure 1-2
Schematic of Colorado River Releases and Diversions



Waters available to a Lower Division state within its apportionment, but having a priority date later than June 25, 1929, have been allocated by the Secretary to water users within that state after consultation with the state as required by the BCPA.

1.3.2.2.3 Mexico Apportionment

Mexico has an annual apportionment of 1.5 maf of Colorado River water, based on the provisions of the Treaty. Mexico may also receive additional water under two conditions. First, when surplus water exists in excess of the amount that can be beneficially used by the Basin States, Mexico is apportioned up to an additional 200,000 af of water which Mexico is allowed to schedule throughout the year in accordance with Article 15 of the Treaty. Second, when high runoff and flooding occur on the Colorado or Gila Rivers that is substantially more than can be put to beneficial use by the Lower Division states, such runoff flows into Mexico.

Deliveries to Mexico are subject to reduction under extraordinary drought conditions or serious accident to the irrigation system in the United States. In such cases, deliveries to Mexico, as provided for under the Treaty, could be reduced in proportion to the reduction faced by users in the United States.

As part of this NEPA documentation, international impacts are addressed in Section 3.16 pursuant to Executive Order 12114-Environmental Effects Abroad of Major Federal Actions, January 4, 1997, and the July 1, 1997 CEQ Guidelines on NEPA Analyses for Transboundary Impacts. (See Attachment B for copies of these documents.)

1.3.3 LONG-RANGE OPERATING CRITERIA

The CRBPA required the Secretary to adopt operating criteria for the Colorado River by January 1, 1970. The LROC, adopted in 1970 (see Attachment A), control the operation of the Colorado River reservoirs in compliance with requirements set forth in the Compact, the CRSPA, the BCPA, the Treaty and other applicable federal laws. Under the LROC, the Secretary makes annual determinations in the AOP (discussed in the following section) regarding the availability of Colorado River water for deliveries to the Lower Division states (Arizona, California and Nevada). A requirement to equalize the active storage between Lake Powell and Lake Mead when there is sufficient storage in the Upper Basin is also included in the LROC, as required by the CRBPA. A more complete discussion of this concept is presented in Section 1.4.2 of this document.

Section 602 of the CRBPA, as amended, provides that the LROC can only be modified after correspondence with the governors of the seven Basin States and appropriate consultation with such state representatives as each governor may designate. The LROC call for formal reviews at least every five years. The reviews are conducted as a public involvement process and are attended by representatives of federal agencies, the

seven Basin States, Indian Tribes, the general public including representatives of the academic and scientific communities, environmental organizations, the recreation industry and contractors for the purchase of federal power produced at Glen Canyon Dam. Past reviews have not resulted in any changes to the criteria.

1.3.4 ANNUAL OPERATING PLAN

The CRBPA requires preparation of an AOP for the Colorado River reservoirs that guides the operation of the system for the water year. The AOP describes how Reclamation will manage the reservoirs over a 12-month period, consistent with the LROC and the Decree. The AOP is prepared annually by Reclamation in cooperation with the Basin States, other federal agencies, Indian tribes, state and local agencies and the general public, including governmental interests as required by federal law. As part of the AOP process, the Secretary makes annual determinations regarding the availability of Colorado River water for deliveries to the Lower Division states as described below.

1.3.4.1 NORMAL, SURPLUS AND SHORTAGE DETERMINATIONS

The Secretary is required to determine when normal, surplus or shortage conditions occur in the lower Colorado River, based on various factors including storage and hydrologic conditions in the Colorado River Basin.

Normal conditions exist when the Secretary determines that sufficient mainstream water is available to satisfy 7.5 maf of annual consumptive use in the Lower Division states. If a state will not use all of its apportioned water for the year, the Secretary may allow other states of the Lower Division to use the unused apportionment, provided that the use is covered under a contract with the consuming entity.

Surplus conditions exist when the Secretary determines that sufficient mainstream water is available for release to satisfy consumptive use in the Lower Division states in excess of 7.5 maf annually. This excess consumptive use is surplus and is distributed for use in California, Arizona and Nevada in allocations of 50, 46 and four percent, respectively. As stated above, if a state will not use all of its apportioned water for the year, the Secretary may allow other states of the Lower Division to use the unused apportionment, provided that the use is covered under a contract with the consuming entity. Surplus water under the Decree, for use in the Lower Division states, was made available by the Secretary in calendar years 1996, 1997, 1998, 1999 and 2000.

Deliveries of surplus water to Mexico in accordance with the Treaty were made in calendar years 1983-1988, 1997, 1998, 1999 and 2000.

Shortage conditions exist when the Secretary determines that insufficient mainstream water is available to satisfy 7.5 maf of annual consumptive use in the Lower Division states. When making a shortage determination, the Secretary must consult with various

parties as set forth in the Decree and consider all relevant factors as specified in the LROC (described above), including Treaty obligations, the priorities set forth in the Decree, and the reasonable consumptive use requirements of mainstream water users in the Lower Division. The Secretary is required to first provide for the satisfaction of the PPRs in the order of their priority, then to users who held contracts on September 30, 1968 (up to 4.4 maf in California), and finally to users who had contracted on September 30, 1968, when the CAP was authorized. To date, a shortage has never been determined.

1.3.5 SYSTEM RESERVOIRS AND DIVERSION FACILITIES

The Colorado River system contains numerous reservoirs that provide an aggregate of approximately 60 maf of active storage. Lake Powell and Lake Mead provide approximately 85 percent of this storage.

Upper Basin reservoirs provide approximately 31.2 maf of active storage, of which Lake Powell provides 24.3 maf. The other major storage reservoirs in the Upper Basin include Flaming Gorge Reservoir on the Green River, Navajo Reservoir on the San Juan River, and Blue Mesa Reservoir on the Gunnison River.

The Lower Basin dams and reservoirs include Hoover, Davis and Parker dams, shown on Map 1-4. Hoover Dam created Lake Mead and can store up to 26.2 maf of active storage. Davis Dam was constructed by Reclamation to re-regulate Hoover Dam's releases and to aid in the annual delivery of 1.5 maf to Mexico. Davis Dam creates Lake Mohave and provides 1.8 maf of active storage. Parker Dam forms Lake Havasu from which water is pumped by both Metropolitan Water District of Southern California (MWD) and the CAP. Parker Dam re-regulates releases from Davis Dam and from the United States Army Corps of Engineers' (Corps) Alamo Dam on the Bill Williams River, and in turn releases water for downstream use in the United States and Mexico. Other Lower Basin mainstream reservoirs, listed in Table 1-2, are operated primarily for the purpose of river flow regulation to facilitate diversion of water to Arizona, California and Mexico. Diversion facilities of the Lower Division states typically serve multiple entities.

Map 1-4
Lower Colorado River Dams

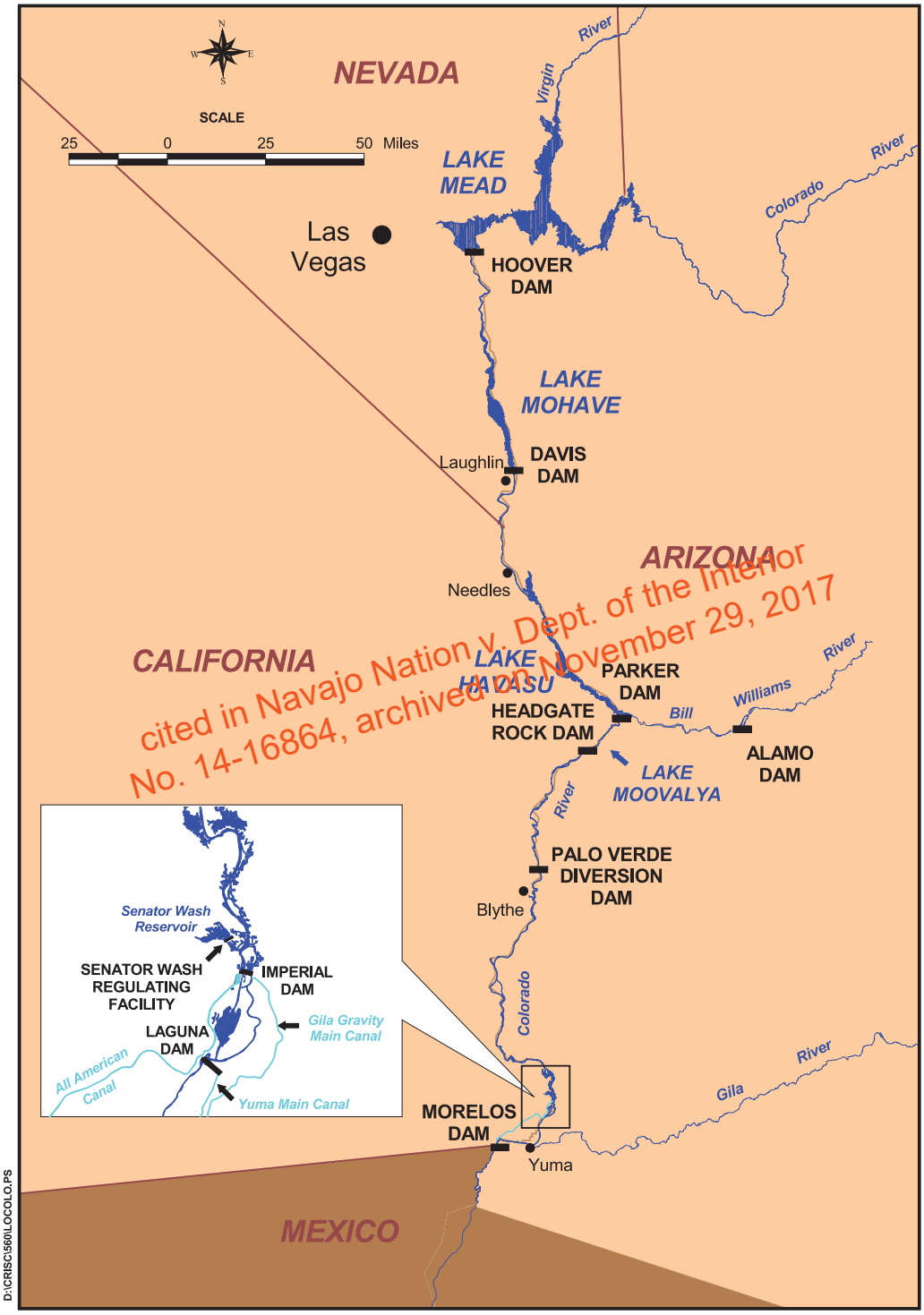


Table 1-2 summarizes the Colorado River storage facilities (i.e., dams and reservoirs) and major diversion dams from Lake Powell downstream to Morelos Dam. Attachment C, Dams and Reservoirs Along the Lower Colorado River, describes the reservoirs and the role that each plays in the operation of the Colorado River system.

Table 1-2
Colorado River Storage Facilities and Major Diversion Dams from Lake Powell to Morelos Dam

Facility	Reservoir	Location	Storage Capacity (af)
Glen Canyon Dam	Lake Powell	Upstream of Lee Ferry, Utah, Arizona	24,322,000 Live
Hoover Dam	Lake Mead	Nevada and Arizona near Las Vegas, 270 miles downstream of Glen Canyon Dam	27,400,000 Live
Davis Dam	Lake Mohave	70 miles downstream of Hoover Dam	1,818,000
Parker Dam	Lake Havasu[1]	150 miles downstream of Hoover Dam	648,000
Headgate Rock Dam	Lake Moovalya	164 miles downstream of Hoover Dam	N.A.[3]
Palo Verde Diversion Dam	Unnamed impoundment	209 miles downstream of Hoover Dam	N.A.[3]
Senator Wash regulating facility	Senator Wash Reservoir[2]	290 miles downstream of Hoover Dam near Imperial Dam	13,800
Imperial Dam	Unnamed impoundment	290 miles downstream of Hoover Dam	1000
Laguna Dam	Unnamed impoundment	300 miles downstream of Hoover Dam	700
Morelos Dam	Unnamed impoundment	320 miles downstream of Hoover Dam	N.A.[3]

[1] Lake Havasu provides a relatively constant water level for pumped diversions by MWD and CAP.
[2] Senator Wash Reservoir is an offstream reservoir with a pumping/generating plant.
[3] Run-of-river diversion structure.

In Nevada, the State's consumptive use apportionment of Colorado River water is used almost exclusively for municipal and industrial (M&I) purposes. About 90 percent of this water is diverted from Lake Mead at a point approximately five miles northwest of Hoover Dam at Saddle Island by the Southern Nevada Water Authority (SNWA) facilities. The remainder of Nevada's diversion occurs below Davis Dam in the Laughlin area.

There are several points of diversion in Arizona. Up to 50,000 af of water is diverted above Lee Ferry. The intake for the CAP is the pumping plant on Lake Havasu below the confluence of the Bill Williams River. Irrigation water for the Fort Mojave Indian Reservation, near Needles, California, is pumped from wells. Irrigation water for the Colorado River Indian Reservation near Parker, Arizona, is diverted at Headgate Rock

Dam, which was constructed for that purpose. A river pumping plant in the Cibola area provides water to irrigate lands adjacent to the river. The last major diversion for Arizona occurs at Imperial Dam, where water is diverted into the Gila Gravity Main Canal for irrigation for the Gila and Wellton-Mohawk projects and into the AAC for subsequent release into the Yuma Main Canal for the Yuma Project and the City of Yuma.

California receives most of its Colorado River water at three diversion points: MWD's pumping plant on Lake Havasu; the Palo Verde Irrigation and Drainage District's diversion at the Palo Verde Diversion Dam near Blythe, California; and the AAC diversion at Imperial Dam.

1.3.6 FLOOD CONTROL OPERATION

Under the BCPA, flood control was specified as the project purpose having first priority for the operation of Hoover Dam. Subsequently, Section 7 of the Flood Control Act of 1944 established that the Secretary of War (now the Corps) will prescribe regulations for flood control for projects authorized wholly or partially for such purposes.

The Los Angeles District of the Corps published the current flood control regulations in the *Water Control Manual for Flood Control, Hoover Dam and Lake Mead Colorado River, Nevada and Arizona* (Water Control Manual) dated December 1982. The Field Working Agreement between Corps and Reclamation for the flood control operation of Hoover Dam and Lake Mead, as prescribed by the Water Control Manual, was signed on February 8, 1984. The flood control plan is the result of a coordinated effort between the Corps and Reclamation; however, the Corps is responsible for providing the flood control regulations and has authority for final approval. The Secretary is responsible for operating Hoover Dam in accordance with these regulations. Any deviation from the flood control operating criteria must be authorized by the Corps.

Flood control operation of Lake Mead was established to deal with two distinct types of flooding—snowmelt and rain. Snowmelt constitutes about 70 percent of the annual runoff in the Upper Basin. Lake Mead's uppermost 1.5 maf of storage capacity, between elevations 1219.61 feet above msl and 1229.0 feet msl, are allocated exclusively to control floods from rain events.

The flood control regulations set forth two primary criteria to deal with snowmelt:

- Preparatory reservoir space requirements, applicable from August 1 through December 31; and
- Application of runoff forecasts to determine releases, applicable from January 1 through July 31.

In preparation for each year's seasonal snow accumulation and associated runoff, the first criterion provides for progressive expansion of the total Colorado River system

reservoir space during the latter months of each year. Required system space increases from 1.5 maf on August 1 to 5.35 maf on January 1. Required flood storage space up to 3.85 maf can be located within Lake Powell and in specified Upper Basin reservoirs.

Space-building releases from Lake Mead are made when needed to meet the required August 1 to January 1 flood control space. Space-building releases beyond the minimum requirements of the Corps' Water Control Manual (often described as anticipatory flood control releases) may be considered by the Secretary. The Secretary takes into consideration the following: 1) the channel capacity of the river below Davis Dam; 2) the channel capacity and channel maintenance of the river below the Southerly International Boundary (SIB) (through the IBWC); and 3) power plant maintenance requirements at Hoover, Davis and Parker dams.

Between January 1 and July 31, flood control releases, based on the maximum forecasted inflow into Lake Mead, may be required to prevent filling of Lake Mead beyond its 1.5 maf minimum flood control space. Each month, runoff forecasts are developed by the National Weather Service's Colorado Basin River Forecast Center. The required monthly releases from Hoover Dam are determined based on available space in Lake Mead and upstream reservoirs and the maximum forecasts of inflow into Lake Mead. Average monthly releases are determined each month and apply only to the current month. Release rates, developed pursuant to the Colorado River Floodway Protection Act of 1986, are discussed in Section 3.6.4.1.

1.3.7 HYDROPOWER GENERATION

Reclamation is authorized by legislation to produce electric power at each of the major Colorado River system dams, except Navajo Dam. Power generation at the Glen Canyon Dam Powerplant requires the water surface elevation of Lake Powell to be above 3490 feet msl. Water is released from Glen Canyon Dam Powerplant into the Colorado River through a combination of the eight main generating units. The minimum water surface elevation of Lake Mead necessary for power generation at Hoover Powerplant is approximately 1083 feet msl. Water is released from Hoover Powerplant to Lake Mohave through a combination of the 17 main generating units. Water is then released at Davis Dam Powerplant into the river through a combination of the five generators. Parker Dam is the last major regulating and reservoir facility on the Lower Colorado River. All releases scheduled from Parker Dam are in response to downstream water orders and reservoir regulation requirements and pass through a combination of its four generators.

Although Reclamation is the federal agency authorized to produce power at the major Colorado River system dams, Western Area Power Administration (Western) is the federal agency authorized to market this power. Western enters into electric service contracts on behalf of the United States with public and private utility systems for distribution of hydroelectric power produced at Reclamation facilities. The released

water generates power, but water is not to be released from any Colorado River facility for the sole purpose of generating power.

Under operating agreements with Western, Reclamation is subject to downstream water requirements to meet the power generation schedules of Hoover, Parker and Davis dams. Western produces these schedules in accordance with existing electric service contracts, recognizing Reclamation's release requirements on the lower Colorado River (i.e., based on downstream delivery requirements) from the respective reservoirs.

1.4 RELATED AND ONGOING ACTIONS

A number of ongoing and new actions proposed by Reclamation and other entities are related to the development of interim surplus criteria and the analysis contained in this document. This section describes these actions and their relationship to the development of interim surplus criteria. The following actions have been described in environmental documents, consultation packages under Section 7 of the ESA, or as project planning documents. Where appropriate, this FEIS incorporates by reference information contained in these documents. The documents described below are available for public inspection upon request at Reclamation offices in Boulder City, Nevada; Salt Lake City, Utah; and Phoenix and Yuma, Arizona.

1.4.1 CALIFORNIA'S COLORADO RIVER WATER USE PLAN

California's Colorado River Water Use Plan (CA Plan), which was formerly known as the California 4.4 Plan or the 4.4 Plan, calls for conservation measures to be put in place that will reduce California's dependency on surplus Colorado River water. Surplus water is required to meet California's current needs until implementation of the conservation measures can take place. During the period ending in 2016, the State of California has indicated that it intends to reduce its reliance on Colorado River water to meet its water needs above and beyond its 4.4-maf apportionment. It is important for the long-term administration of the system to bring the Lower Basin uses into accordance with the Lower Basin normal apportionment. In order to achieve its goals, California has expressed a need to continue to rely in some measure on the existence of surplus Colorado River water through 2016. These interim surplus criteria could aid California and its primary Colorado River water users as California reduces its consumptive use to 4.4 maf while ensuring that the other Basin States will not be placed at undue risk of future shortages.

The CA Plan contains numerous water conservation projects, intrastate water exchanges, and groundwater storage facilities. The CA Plan is related to the implementation of the interim surplus criteria in the ways discussed below.

First, implementation of the CA Plan is necessary to ensure the Colorado River system can meet the normal year deliveries in the Lower Basin over the long term. Failure of California to comply with the CA Plan places at risk the objective of providing reliable

delivery of water for beneficial consumptive use to Lower Basin users. Therefore, the Secretary may condition the continuation of interim surplus criteria for the entire period through 2016 on a showing of satisfactory progress in implementing the CA Plan. Regardless of which alternative is ultimately selected, failure of California to carry out the CA Plan may result in termination or suspended application of the proposed interim surplus criteria. In that event, the Secretary would fashion appropriate surplus criteria for the remaining period through 2016. For example, the Basin States Alternative presented in Chapter 2 anticipates that the 70R strategy would be used in the event of such a reversion.

Second, from the perspective of the State of California, because of the linkage between various elements of the CA Plan and the quantities of water involved, a reliable supply of interim surplus water from the Colorado River is an indispensable pre-condition to successful implementation of the CA Plan.

From the standpoint of environmental documentation and compliance, the CA Plan and its various elements have been, or will be, addressed under separate federal and/or state environmental reporting procedures.

1.4.1.1 IMPERIAL IRRIGATION DISTRICT/SAN DIEGO COUNTY WATER AUTHORITY WATER TRANSFER

The Imperial Irrigation District (IID)/San Diego County Water Authority (SDCWA) water transfer is one of the intrastate exchanges that is a part of the CA Plan. SDCWA has negotiated an agreement for the long-term transfer of conserved water from the IID. Under the proposed contract, IID customers would undertake water conservation efforts to reduce their use of Colorado River water. Water conserved through these efforts would be transferred to SDCWA. The agreement sets the transfer quantity at a maximum of 200 kaf/year. After at least 10 years of primary transfers, an additional discretionary component not to exceed 100 kaf/year may be transferred to SDCWA, MWD of Southern California, or Coachella Valley Water District in connection with the settlement of water rights disputes between IID and these agencies. The initial transfer target date is 2002, or whenever the conditions necessary for the agreement to be finalized are satisfied or waived, whichever is later. This transfer is being addressed in an ongoing EIS/EIR and involves the change in point of delivery of up to 300 kaf/year from Imperial Dam to Parker Dam.

1.4.1.2 ALL-AMERICAN AND COACHELLA CANAL LINING PROJECTS

Two other components of the CA Plan having effects on the river are the All-American and Coachella Canal Lining Projects (the Coachella Canal is a branch of the AAC). These two similar actions involve the concrete lining of unlined portions of the canals to conserve water presently being lost as seepage from the earthen reaches. Together the projects involve a change in point of delivery from Imperial Dam to Parker Dam that totals 93.7 kaf/year, 67.7 kaf/year for the AAC and 26 kaf/year for the

Coachella Canal. The effects of this change in point of delivery are being addressed in the Secretarial Implementation Agreement EA and BA (described in Section 1.4.5). The Record of Decision (ROD) for the All-American Canal Lining Project was approved on July 29, 1994. Construction is expected to begin in 2001. A draft EIS/EIR for the Coachella Canal Lining Project was released on September 22, 2000 for public review.

1.4.2 GLEN CANYON DAM OPERATIONS

Glen Canyon Dam is operated consistent with the CRSPA and the LROC, which were promulgated in compliance with Section 602 of the CRBPA. Glen Canyon Dam is also operated consistent with the 1996 ROD on the Operation of Glen Canyon Dam (Attachment C) developed as directed under the Grand Canyon Protection Act of 1992.

The minimum release from Lake Powell, as specified in the LROC, is 8.23 maf per year. In years with very low inflow, or in years when Lake Powell is significantly drawn down, annual releases of 8.23 maf from Lake Powell are made. The LROC also require that, when Upper Basin storage is greater than the storage required under Section 602(a) of the CRBPA, releases from Lake Powell will periodically be governed by the objective to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell. Because of this equalization provision in the LROC, changes in operations at Lake Mead will, in some years, result in changes in annual release volumes from Lake Powell. It is through this mechanism that delivery of surplus water from Lake Mead can influence the operation of Glen Canyon Dam. Equalization is not required when there exists insufficient storage in the Upper Basin, per Section 602(a) of the CRBPA.

In acknowledgement that the operation of Glen Canyon Dam, as authorized, to maximize power production was having a negative impact on downstream resources, the Secretary determined in July 1989 that an Environmental Impact Statement (EIS) should be prepared. The *Operation of Glen Canyon Dam EIS* developed and analyzed alternative operation scenarios that met statutory responsibilities for protecting downstream resources and achieving other authorized purposes, while protecting Native American interests. A final EIS was completed in March 1995, and the Secretary signed a ROD on October 8, 1996. Reclamation also consulted with the United States Fish and Wildlife Service (Service) under the ESA and incorporated the Service's recommendations into the ROD.

The ROD describes criteria and plans for dam operations and includes other measures to ensure Glen Canyon Dam is operated in a manner consistent with the Grand Canyon Protection Act of 1992. Among these are an Adaptive Management Program, beach/habitat-building flows (BHBFs), beach/habitat-maintenance flows, and further study of temperature control.

The ROD is based on the EIS, which contains descriptions and analyses of aquatic and riparian habitats below Glen Canyon Dam, effects of Glen Canyon Dam release patterns on the local ecology, cultural resources, sedimentation processes associated with the maintenance of backwaters and sediment deposits along the river, Native American interests, and relationships between release patterns and the value of hydroelectric energy produced. Analyses of effects on other resources within the affected area are also included. Additional information concerning the operation of Glen Canyon Dam is contained in Section 3.3.

1.4.2.1 ADAPTIVE MANAGEMENT PROGRAM

The Adaptive Management Program (AMP) provides a process for assessing the effects of current operations of Glen Canyon Dam on downstream resources and using the results to develop recommendations for modifying operating criteria and other resource management actions. This is accomplished through the Adaptive Management Work Group (AMWG), a federal advisory committee. The AMWG consists of stakeholders that are federal and state resource management agencies, representatives of the seven Basin States, Indian Tribes, hydroelectric power marketers, environmental and conservation organizations and recreational and other interest groups. The duties of the AMWG are in an advisory capacity only. Coupled with this advisory role are long-term monitoring and research activities that provide a continual record of resource conditions and new information to evaluate the effectiveness of the operational modifications.

1.4.2.2 BEACH/HABITAT-BUILDING FLOWS AND BEACH/HABITAT-MAINTENANCE FLOWS

BHBF releases are scheduled high releases of short duration that are in excess of power plant capacity required for dam safety purposes and are made according to certain specific criteria as described in Section 3.6.2. These BHBFs are designed to rebuild high elevation sandbars, deposit nutrients, restore backwater channels, and provide some of the dynamics of a natural system. The first test of a BHBF was conducted in Spring of 1996.

Beach/habitat-maintenance flow releases are releases at or near power plant capacity, which are intended to maintain favorable beach and habitat conditions for recreation and fish and wildlife, and to protect Tribal interests. Beach/habitat-maintenance flow releases can be made in years when no BHBF releases are made.

Both beach/habitat-building and beach/habitat-maintenance flows, along with the testing and evaluation of other types of releases under the AMP, were recommended by the Service to verify a program of flows that would improve habitat conditions for endangered fish. The proposed interim surplus criteria could affect the range of storage conditions in Lake Powell and alter the flexibility to schedule and conduct such releases or to test other flow patterns. The magnitude of this reduction in flexibility has been

evaluated for each interim surplus alternative. The results are presented in Section 3.6, *Riverflow Issues*.

1.4.2.3 TEMPERATURE CONTROL AT GLEN CANYON DAM

In 1994, the Service issued a *Biological Opinion on the Operation of Glen Canyon Dam*. One of the elements of the reasonable and prudent alternative in the Biological Opinion, also a common element in the Glen Canyon Dam EIS, was the evaluation of methods to control release temperatures and, if viable, implement controls. Reclamation agreed with this recommendation and included it in the *Operation of Glen Canyon Dam Final Environmental Impact Statement* and subsequent ROD.

Reclamation has issued a draft planning report and environmental assessment (EA) entitled *Glen Canyon Dam Modifications to Controls and Downstream Temperatures* (Reclamation, 1999). Based on comments to this draft EA, Reclamation is currently in the process of preparing a new draft EA on temperature control at Glen Canyon Dam.

Interim surplus criteria could result in new information related to temperature control at Glen Canyon Dam. Data and information made available from analysis related to interim surplus criteria will be utilized in the revised EA on temperature control at Glen Canyon Dam. Such information would also be considered in the development of an appropriate design for a temperature control device.

1.4.3 ACTIONS RELATED TO THE BIOLOGICAL AND CONFERENCE OPINION ON LOWER COLORADO RIVER OPERATIONS AND MAINTENANCE

Reclamation prepared a Biological Assessment (BA) in accordance with Section 7 of the ESA, addressing effects of ongoing and projected routine lower Colorado River operations and maintenance (Reclamation, 1996). After formal consultation, a Biological and Conference Opinion (BCO) was prepared by the Service (Service, 1997). Both documents are described in Section 1.4.5, Documents Incorporated by Reference. Pursuant to the reasonable and prudent alternative and 17 specific provisions provided in the BCO, Reclamation is taking various actions that benefit the riparian region of the lower Colorado River and associated species. In particular, these actions include: 1) acquisition, restoration, and protection of potential and occupied Southwestern willow flycatcher habitat; 2) extensive life history studies for Southwestern willow flycatcher along 400 miles of the lower Colorado River and other areas; and 3) protection and enhancement of endangered fish species through risk assessments, assisted rearing, and development of protected habitats along the lower Colorado River. This five-year BCO provides ESA compliance for Reclamation actions on the lower Colorado River until 2002.

The BA and BCO contain life histories/status of lower Colorado River species, descriptions of ongoing and projected routine operation and maintenance activities, the

Secretary's discretionary management activities, operation and maintenance (O&M) procedures, endangered species conservation program, environmental baseline, effects of ongoing operations, reasonable and prudent alternatives, and supporting documentation useful in this FEIS. The 1996 BA and the 1997 BCO did not anticipate or address the effects of specific interim surplus criteria on the species considered. A separate Section 7 ESA consultation is in progress for the proposed action addressed by this FEIS.

1.4.4 LOWER COLORADO RIVER MULTI-SPECIES CONSERVATION PROGRAM

Following the designation of critical habitat for three endangered fish species on nearly all of the lower Colorado River in April of 1994, the three Lower Basin States of Arizona, California and Nevada, Reclamation and the Service initiated the Lower Colorado River Multi-Species Conservation Program (LCRMSCP), which was one of the reasonable and prudent provisions of the five-year BCO received in 1997. The purpose of the LCRMSCP is to obtain long-term (50-year) ESA compliance for both federal and non-federal water and power interests. The LCRMSCP is a partnership of Federal, State, Tribal, and other public and private stakeholders with an interest in managing the water and related resources of the lower Colorado River Basin. In August 1995, the Department of the Interior and Arizona, California and Nevada entered into a Memorandum of Agreement (MOA) and later a Memorandum of Clarification (MOC) for development of the LCRMSCP. The purpose of the MOA/MOC was to initiate development of an LCRMSCP that would accomplish the following objectives:

- Conserve habitat and work toward the recovery of threatened and endangered species and reduce the likelihood of additional species listing under the ESA; and
- Accommodate current water diversions and power production and optimize opportunities for future water and power development.

The LCRMSCP is currently under development, and it is anticipated that the final EIS-environmental impact report (EIR) will be finalized in 2001. Once the LCRMSCP is accepted by the Service, Reclamation and other federal agencies, as well as the participating non-federal partners, will have achieved ESA compliance for ongoing and future actions.

Since the interim surplus criteria determination is scheduled to be completed prior to the completion of the LCRMSCP, a separate Section 7 consultation has been conducted with the Service on the anticipated effects of implementing the interim surplus criteria.

1.4.5 SECRETARIAL IMPLEMENTATION AGREEMENT RELATED TO CALIFORNIA'S COLORADO RIVER WATER USE PLAN

Within California, the allocation of Colorado River water is stipulated by various existing agreements among the seven parties with diversion rights. Recently, these parties have negotiated a *Quantification Settlement Agreement* which further defines the priorities for use of Colorado River water in California. This agreement provides a basis for various water conservation and transfer measures described in the CA Plan (California, 2000). The water transfers would require changes in the points at which the Secretary would deliver transferred water to various California entities, as compared with provisions in existing water delivery contracts. The operational changes caused by the water transfers are being addressed in separate NEPA and ESA documentation.

1.4.6 OFFSTREAM STORAGE OF COLORADO RIVER WATER AND DEVELOPMENT AND RELEASE OF INTENTIONALLY CREATED UNUSED APPORTIONMENT IN THE LOWER DIVISION STATES

The above titled rule establishes a procedural framework for the Secretary to follow in considering, participating in, and administering Storage and Interstate Release Agreements among the States of Arizona, California and Nevada (Lower Division states). The Storage and Interstate Release Agreements would permit State-authorized entities to store Colorado River water offstream, develop intentionally created unused apportionment (ICUA), and make ICUA available to the Secretary for release for use in another Lower Division state. This rule provides a framework only and does not authorize any specific activities. The rule does not affect any Colorado River water entitlement holder's right to use its full water entitlement, and does not deal with intrastate storage and distribution of water. The rule only facilitates voluntary interstate water transactions that can help satisfy regional water demands by increasing the efficiency, flexibility, and certainty in Colorado River management. A Finding of No Significant Impact (FONSI) was approved on October 1, 1999.

1.5 DOCUMENTS INCORPORATED BY REFERENCE

During recent decades, a considerable amount of environmental information has been obtained and environmental analyses conducted concerning the operation of the Colorado River water supply system. Much of this information is contained in various documents prepared under NEPA and the ESA. These documents have been previously distributed to interested agencies and private parties. In the interest of avoiding duplication and undue paperwork, this FEIS incorporates by reference parts or all of several documents. The documents described below are available for public inspection upon request at Reclamation offices in Boulder City, Nevada; Salt Lake City, Utah; Phoenix and Yuma, Arizona.

- *Biological Assessment for Proposed Interim Surplus Criteria, Secretarial Implementation Agreements for California Water Plan Components and Conservation Measures,* August 30, 2000.

  This BA was prepared by Reclamation in Boulder City, Nevada, to address the potential effects on threatened or endangered species and designated critical habitat along the lower Colorado River attributable to the water transfers proposed by California as part of its CA Plan and to the implementation of the proposed interim surplus criteria. The BA was prepared to facilitate formal Section 7 consultation with the Service, which resulted in the BO cited below addressing these proposed actions. The pertinent parts of this BA are the ecology of aquatic and riparian habitat systems from Lake Mead to the SIB and the potential effects of these proposed actions on listed species and critical habitat. With regard to any potential effects of the proposed adoption of interim surplus criteria on ESA listed species in the Republic of Mexico or the Gulf of California, Reclamation has prepared additional information to supplement this assessment.

- *Biological Opinion on Proposed Interim Surplus Criteria, Secretarial Implementation Agreements for California Water Plan Components and Conservation Measures, December,* 2000.

  This Biological Opinion (BO), issued by the Service in Phoenix, Arizona, through formal consultation with Reclamation in Boulder City, Nevada, addresses the potential effects on threatened or endangered species and designated critical habitat along the lower Colorado River attributable to the water transfer agreements proposed by California as part of its CA Plan and to the implementation of interim surplus criteria. The BO identifies reasonable and prudent measures for the avoidance of adverse effects of these proposed actions. The pertinent parts of the BO are the life histories of various species, their habitat descriptions, and relationships with river operations.

- *Biological Assessment on Transboundary Effects for Proposed Interim Surplus Criteria, December,* 2000.

  This BA was prepared by Reclamation in Boulder City, Nevada, to address the potential effects on threatened or endangered species in the Colorado River Delta of Mexico attributable to the implementation of proposed interim surplus criteria. The BA was prepared to facilitate informal consultation with the Service and the National Marine Fisheries Service, which is in progress. The pertinent parts of the BA are the ecology of aquatic and riparian habitat systems from the SIB to the estuary at the mouth of the Colorado River in the Sea of Cortez and the potential effects of the proposed action on United States-listed species and critical habitat.

- *Description and Assessment of Operations, Maintenance, and Sensitive Species of the Lower Colorado River (Biological Assessment)*, August 1996.

  This BA was prepared by Reclamation in Boulder City, Nevada, to develop an inventory of aquatic and marsh habitat along the lower Colorado River and to analyze the relationships between river operation and maintenance of threatened and endangered species and critical habitat. The BA was prepared to facilitate the formal Section 7 consultation with the Service, which resulted in the April 1997 BCO cited below. The pertinent parts of the BA are the ecology of aquatic and riparian habitat systems from Lake Mead to the SIB and the potential effects of ongoing operation and maintenance on listed species and critical habitat.

- *Biological and Conference Opinion on Lower Colorado River Operations and Maintenance*, April 1997.

  This BCO, prepared by the Service in Phoenix, Arizona, through formal consultation with Reclamation in Boulder City, Nevada, addresses the critical habitat for endangered species along the lower Colorado River that is related to the operation of the river for delivery of water to the Lower Division states and Mexico. The report identifies a reasonable and prudent alternative for the avoidance of adverse effects of river operation. The pertinent parts of the conference and opinion are the life histories of various species, their habitat descriptions, and relationships with river operations.

- *Operation of Glen Canyon Dam Final Environmental Impact Statement*, March 1995, and *Record of Decision*, October 8, 1996.

  The FEIS was prepared by Reclamation in Salt Lake City, Utah, to evaluate alternative plans for the water releases at Glen Canyon Dam and Powerplant and the ecological effects on the Colorado River corridor downstream to Separation Rapid. The FEIS was based on an extraordinary depth of analysis, involving numerous work groups with specialists in various disciplines from other agencies and private practice. The pertinent parts of the FEIS are the aquatic and riparian habitats below Glen Canyon Dam, the relationships between Glen Canyon Dam and Powerplant release patterns, effects on downstream ecology, and the sedimentation processes associated with the maintenance of backwaters and beaches along the river. The relationships between release patterns and the value of hydroelectric energy produced were also pertinent.

  The ROD adds commitments in the following areas: establishment of an AMP, monitoring and protecting cultural resources, flood frequency reduction measures, BHBF releases, efforts to establish a new population of the humpback chub, further study of selective withdrawals from Lake Powell, and emergency exception criteria to respond to various emergency situations.

- *Glen Canyon Dam Modification to Control Downstream Temperatures Plan and Environmental Assessment*, January 1999 Draft.

  This draft planning report and EA was prepared by Reclamation in Salt Lake City, Utah, to consider alternatives for modifying the intakes to the penstocks to permit the selective withdrawal of water from Lake Powell at various temperatures. The pertinent parts of the report are the sensitivity of downstream fish species, particularly endangered species, to temperatures of Colorado River water downstream from the dam and the degree of temperature control that could be achieved by the modifications. Based on comments on the draft EA, Reclamation is in the process of preparing a new draft EA on temperature control at Glen Canyon Dam.

- *Final Biological Opinion, Operation of Glen Canyon Dam as the Modified Low Fluctuating Flow Alternative*, December 1994.

  This Biological Opinion was prepared by the Service in Phoenix, Arizona, through consultation with Reclamation in Salt Lake City, Utah. The document addresses Glen Canyon Dam operations and the critical habitat for endangered species in the Colorado River from Glen Canyon Dam to Lake Mead and identifies a reasonable and prudent alternative for the avoidance of jeopardy. The document also provides environmental baseline and status of species in the action area related to the preferred alternative.

- *Glen Canyon Adaptive Management Work Group Charter*, December 8, 1998.

  This charter outlines the membership and duties of the AMWG. The duties are to establish AMWG operating procedures, advise the Secretary in meeting environmental and cultural commitments of the Glen Canyon Dam FEIS and ROD, recommend a framework for AMP policy, goals and direction; develop recommendations for modifying dam operations and operating criteria; define and recommend resource management objectives for a long-term monitoring plan; review and provide input to the Secretary on required reports; facilitate input and coordination of information from stakeholders to the Secretary; and monitor and report on compliance of all program activities with applicable laws, permitting requirements, and the Grand Canyon Protection Act.

- *Quality of Water, Colorado River Basin, Progress Report No. 19*, January 1999.

  This report is the latest of a series of biennial reports to Congress, prepared by Reclamation in Salt Lake City, Utah, that summarize progress of the Colorado River Water Quality Improvement Program in controlling Colorado River salinity. The pertinent parts of the report are those which discuss the mechanisms that contribute dissolved salts to the river system, the relationships between dissolved salt

concentrations and abundance of basin water supply, and the effects of dissolved minerals on uses of Colorado River water.

- *Southern Nevada Water Authority Treatment and Transmission Facility Final Environmental Impact Statement,* September 1996, and *Record of Decision,* November 1996.

  This EIS and ROD contain pertinent information concerning the influence of Las Vegas Valley drainage on the water quality in Lake Mead's Boulder Basin and the resulting quality of water pumped from the reservoir by the SNWA's intake facilities. Critical intake elevations are identified in the documents.

- *Final Programmatic Environmental Assessment for Rulemaking for Offstream Storage of Colorado River Water and Development and Release of Intentionally Created Unused Apportionment in the Lower Division States*, October 1999.

  This document, which includes a BA, analyzes the environmental effects of potential changes in reservoir and river operations that could occur if a Lower Division state diverts and stores water for the benefit of another Lower Division state for future use (interstate offstream storage). The BA contains aquatic and marsh habitat descriptions and the relationships between changes in diversions from Lake Mead and Lake Havasu and downstream aquatic and marsh habitat maintenance. The relationships between release patterns from Hoover Dam and the value of hydroelectric energy are also useful for this analysis.

CHAPTER TWO

DESCRIPTION OF ALTERNATIVES

2 DESCRIPTION OF ALTERNATIVES

2.1 INTRODUCTION

This chapter discusses the process used to define the No Action Alternative and develop a range of reasonable interim surplus criteria alternatives, and summarizes various alternatives that were considered but eliminated from further analysis. It then describes the alternatives analyzed in this FEIS. Modeling procedures and assumptions used to analyze the alternatives are discussed in Section 3.3. The end of this chapter presents a table of effects of all alternatives.

2.2 DEVELOPMENT OF ALTERNATIVES

This FEIS considers five interim surplus criteria alternatives as well as a No Action Alternative/baseline that was developed for comparison of potential effects. The five action alternatives considered include the Basin States Alternative (preferred alternative), the Flood Control Alternative, the Six States Alternative, the California Alternative, and the Shortage Protection Alternative (as described in Section 2.3). Section 2.2.1 discusses the strategies and origins of the action alternatives and describes alternatives that were considered but eliminated from further analysis.

2.2.1 OPERATING STRATEGIES FOR SURPLUS DETERMINATION

2.2.1.1 THE R STRATEGY

In 1986, Reclamation developed an operating strategy for distributing surplus water and avoiding spills (Reclamation, 1986). That analysis established the Spill Avoidance or "R" strategy. The development of this strategy was an outcome of sustained flood control releases at Lake Mead from 1983 through 1986. The R strategy assumes a particular percentile historical runoff, along with normal 7.5 maf delivery to Lower Division states, for the next year. Applying these values to current reservoir storage, the projected reservoir storage at the end of the next year is calculated. If the calculated space available at the end of the next year is less than the space required by flood control criteria, then a surplus condition is determined to exist.

Two alternatives considered in this FEIS use variations of the R strategy. The 70R strategy uses an annual runoff of 17.4 maf whereas the 75R strategy uses 18.1 maf. The 70R strategy was used to represent the baseline as described in Section 2.3.1.

2.2.1.2 THE A STRATEGY

In the early and mid-1990s, Reclamation continued discussing surplus criteria strategies with the Colorado River Management Work Group (CRMWG), which formed a technical committee was formed to investigate additional surplus criteria strategies.

One of the strategies developed through the CRMWG analysis was the Flood Control avoidance or "A" strategy. This strategy determines when there is insufficient storage space in Lake Mead and upstream reservoirs, in order to avoid flood control releases from Lake Mead with a particular percent assurance.

The most common usage became the 70 percent assurance level (70A strategy). This alternative was eliminated because the modeling results were so similar to the Flood Control Alternative and the No Action/baseline (70R strategy) that it was not necessary to analyze it.

2.2.1.3 THE P STRATEGY

Another strategy is the Shortage Protection or "P" strategy. This strategy is based on making surplus water available while maintaining storage sufficient to meet a 7.5 maf Lake Mead release requirement, while avoiding the likelihood of a future shortage determination at a specified assurance level. Through a separate modeling study, Reclamation determined the Lake Mead storage needed in each future year to meet Lower Basin and Mexico demands, with a specified percent assurance that Lake Mead would not drop below a specified elevation. Water stored in Lake Mead in excess of that storage requirement is deemed surplus to be made available to the Lower Basin states. The Shortage Protection Alternative used in this FEIS, commonly referred to as the 80P strategy, is described in more detail in Section 2.3.6.

2.2.1.4 FLOOD CONTROL STRATEGY

Under a flood control strategy, surplus conditions are determined only when flood control releases from Lake Mead are occurring or projected to occur in the subsequent year. In the 1998, 1999 and 2000 Annual Operating Plans (AOPs), Reclamation used the projection of flood control releases as the basis for making surplus water available to the Lower Division States. The Flood Control Alternative in this FEIS uses this strategy and is described in Section 2.3.3.

2.2.2 ORIGINS OF THE CALIFORNIA, SIX STATES, AND BASIN STATES ALTERNATIVES

On December 17, 1997, California presented to the other Basin States its draft 4.4 Plan (CRBC, 1997), a plan to achieve a reduction in its dependence on surplus water from the Colorado River, through various conservation measures, water exchanges and conjunctive use programs. One of the elements of the draft 4.4 Plan was the expectation that the Secretary would continue to determine surplus conditions on the Colorado River until 2015. California proposed criteria on which the Secretary would base his determinations of surplus conditions during the interim period.

In 1998, in response to California's 1997 proposal of interim surplus criteria, the other six states within the Colorado River Basin (Six States) submitted a proposal with

surplus criteria that were similar in structure to those in California's proposal. Under the proposal from the Six States, use of surplus water supplies would be limited depending on the occurrence of various specified Lake Mead surface elevations. The interim surplus criteria proposed by the Six States, presented in Attachment E, were used to formulate the "Six States Alternative" presented in Section 2.3.4.

California subsequently proposed specific interim surplus criteria which were attached to the October 15, 1999 *Key Terms for Quantification Settlement Among the State of California, Imperial Irrigation District, Coachella Valley Water District, and Metropolitan Water District of Southern California* (See Attachment F). California also updated, renamed and re-released its 4.4 Plan in May 2000. The revised plan is now known as the California Colorado River Water Use Plan (CA Plan). The interim surplus criteria proposal stemming from the CA Plan and Quantification Settlement was used to formulate the "California Alternative" detailed in Section 2.3.5.

In July 2000, during the public comment period on the DEIS, Reclamation received a draft proposal for interim surplus criteria from the seven Colorado River Basin States (Seven States). After a preliminary review of that proposal, Reclamation published it in the August 8, 2000 *Federal Register* for review and consideration by the public during the public review period for the DEIS. Reclamation published minor corrections to the proposal in a *Federal Register* notice of September 22, 2000. Copies of the *Federal Register* notices are in Chapter 5. Reclamation derived the Basin States Alternative in this FEIS from the draft Seven States Proposal.

2.2.3 PACIFIC INSTITUTE PROPOSAL

On February 15, 2000, a consortium of environmental organizations led by the Pacific Institute for Studies in Development, Environment and Security (Pacific Institute) presented an interim surplus criteria proposal for consideration by the Secretary. Their proposal (as clarified by the Pacific Institute's September 8, 2000 letter of comment on the DEIS), contains interim surplus criteria that are similar to the criteria in the Six States Alternative with respect to Lower Basin surplus determinations. The proposal and excerpts from the September 8 letter are included as Attachment G to this FEIS. The Pacific Institute Proposal also suggested that, during years when Lake Mead's surface elevation exceeds 1120.4 feet mean sea level (msl), at least 32,000 af of additional water (i.e. water in excess of Mexico's treaty deliveries) be delivered to Mexico for the purpose of restoring and/or maintaining habitat in the upper reaches of the Colorado River delta. The proposal also included 260,000 af of additional water to be delivered to the Colorado River delta for ecological restoration purposes when reservoir elevations are high.

This proposal is beyond the purpose and need for the proposed action because it would expand the proposed action by prescribing releases of Colorado River water stored in Lake Mead to Mexico. The proposed adoption of surplus criteria for use in Arizona, California and Nevada does not, by definition, apply to determinations of surplus to the

United Mexican States (Mexico). Water delivery to Mexico is governed by the United States-Mexico Water Treaty of 1944. Releases of water to Mexico are not addressed by Section III(3) of the LROC or Article II(B)(2) of the Decree and are therefore not part of the proposed action analyzed in this EIS. From its initiation of this proposed action on May 18, 1999, Reclamation has clearly stated that its undertaking was intended to "identify those circumstances under which the Secretary of the Interior ("Secretary") may make Colorado River water available for delivery to the States of Arizona, California, and Nevada …." (64 *Federal Register* 27008, May 18, 1999). The proposed action only involves determinations of domestic surplus conditions pursuant to Article III(3) of the LROC (64 *Federal Register* 27009). Section 1.1.4 of the DEIS (page 1-4) states that "This proposed action is not intended to identify conditions when Mexico may schedule [its] 0.2 maf [surplus under Article 10(b) of the Treaty]." The United States, in its consultation with Mexico conducted through the Department of State, has consistently informed Mexico that the proposed action does not address determinations of surplus conditions to Mexico under the 1944 Treaty, and is limited to declarations of surplus conditions for the Lower Division states.

In addition to changing and expanding the proposed action in a manner inconsistent with the purpose and need for the action, the Pacific Institute's proposed alternative would also require that Reclamation make releases of water from Lake Mead to Mexico in a manner that is inconsistent with the mandatory injunction issued to the Secretary by the United States Supreme Court in Article II of the Arizona v. California Decree (1964). Pacific Institute's proposal calls for releases of water from Lake Mead in excess of the amount of water that would be released to Mexico "in satisfaction of [the United States] obligations to the United States of Mexico under the treaty dated February 3, 1944 …." Reclamation does not believe that the range of reasonable alternatives includes alternatives that would violate the United States Supreme Court's Decree and injunction. For the foregoing reasons, Reclamation concluded that the proposed alternative was not a reasonable alternative and it accordingly was not analyzed in this EIS.

Because the Lower Basin surplus determinations of the Pacific Institute's proposed interim surplus criteria are similar to, and within the range of, those contained in the alternatives already being analyzed, and because the proposed delivery of additional water to Mexico is beyond the purpose and need for interim surplus criteria, the Pacific Institute's proposal is not analyzed in this FEIS.

2.2.4 FORMULATION OF ALTERNATIVES

In response to the CA Plan and the Six States proposal, and the dialogue among Reclamation and the seven Basin States, Reclamation initiated a NEPA process to provide structure to evaluating potential interim surplus criteria alternatives and to determine and disclose the potential effects of these interim surplus criteria. At the initiation of the NEPA process, Reclamation began a public scoping process. Under that process, Reclamation conducted a series of public meetings in 1999 to inform

interested parties of the consideration being given to the development of interim surplus criteria, to show options and proposals developed up to that time, and to solicit public and agency comments and suggestions regarding the formulation and evaluation of alternatives for the criteria.

The alternatives below were presented at the public meetings:

Flood Control Alternative
Spill Avoidance Alternative (70R)
Flood Control Avoidance Alternative (70A)
Multi-tier Alternative (based on the Six States Plan)
Shortage Protection Alternative (80P)

The scoping process and issues identified, including those associated with alternatives development, are discussed in Chapter 5 of this FEIS. Following the scoping meetings, and in consideration of comments received, Reclamation included the interim surplus criteria proposals of the Six States and California for evaluation in the DEIS. It should be noted that while the California and Six States alternatives analyzed in the DEIS and in this FEIS were based on criteria proposed by California and the Six States, the respective alternatives presented in this FEIS do not contain all the specific elements of those plans.

The draft Seven States proposal was discussed informally with the public during the public review period for the DEIS, and was the subject of comment in various letters received by Reclamation in response to the DEIS and the *Federal Register* notice of the proposal. Based on these discussions and comments, Reclamation formulated an alternative based on the Seven States proposal and identified it as the preferred alternative (the Basin States Alternative herein). It should be noted that the Basin States Alternative presented in this FEIS does not contain all the specific elements of the draft Seven States proposal.

2.2.5 UTILIZATION OF PROPOSALS FROM THE BASIN STATES

As discussed in Section 2.2.2, various proposals submitted by individual Colorado River Basin states or groups of states were used by Reclamation to formulate interim surplus criteria alternatives. In recognition of the need to limit the delivery of surplus water at lower Lake Mead water levels, these proposals specified allowable uses of surplus water at various triggering levels.

The Secretary will continue to apportion surplus water consistent with the applicable provisions of the Decree, under which surplus water is divided 50 percent to California, 46 percent to Arizona, and 4 percent to Nevada. The Secretary also intends to appropriately report the accumulated volume of water delivered to MWD under surplus conditions. The Secretary also intends to honor any forbearance arrangements made by

various parties for the delivery of surplus water or reparations for future shortage conditions.

2.2.6 NO ACTION ALTERNATIVE AND BASELINE CONDITION

As required by NEPA, a No Action alternative must be considered during the environmental review process. Under the No Action Alternative, determinations of surplus would continue to be made on an annual basis, in the AOP, pursuant to the LROC and the Decree as discussed in Chapter 1. The No Action Alternative represents the future AOP process without interim surplus criteria. Surplus determinations consider such factors as end-of-year system storage, potential runoff conditions, projected water demands of the Basin States and the Secretary's discretion in addressing year-to-year issues. However, the year-to-year variation in the conditions considered by the Secretary in making surplus water determinations makes projections of surplus water availability highly uncertain.

The approach used in this FEIS for analyzing the hydrologic aspects of the interim surplus criteria alternatives was to use a computer model that simulates specific operating parameters and constraints. In order to follow CEQ guidelines calling for a No Action alternative for use as a "baseline" against which to compare project alternatives, Reclamation selected a specific operating strategy for use as a baseline condition, which could be described mathematically in the model.

The baseline is based on a 70R spill avoidance strategy. Reclamation has utilized a 70R strategy for both planning purposes and studies of surplus determinations in past years. When Reclamation reviewed previous surplus determinations as part of the DEIS effort, the data indicated that the 1997 surplus determination did not precisely fit the 70R strategy. As a result, Reclamation selected the 75R strategy as representative of recent operational decisions, for use as the baseline condition in the DEIS. However, based on further review and analysis, public comment, and discussion with representatives of the states during the DEIS review period, Reclamation is using the 70R strategy for the baseline condition in this FEIS. While the 70R strategy is used to represent baseline conditions, it does not represent a decision by Reclamation to utilize the 70R strategy for determination of future surplus conditions in the absence of interim surplus criteria. It should be noted that the 70R strategy and 75R strategy yield very similar results for the purpose of determining impacts associated with the action alternatives analyzed in this FEIS. Figure 2-1 illustrates the close relationship between the 70R and 75R trigger lines (see Section 2.3.1.2).

2.3 DESCRIPTION OF ALTERNATIVES

This section describes the five interim surplus criteria alternatives analyzed in this FEIS, and No Action, which is represented by the baseline condition for comparison purposes. The Secretary would base his annual determination of surplus conditions on the criteria selected, if any, as part of the AOP process unless extraordinary

circumstances arise. Such circumstances could include operations necessary for safety of dams or other emergency situations, the failure of California to meet its commitment to reduce dependence on Colorado River water, or other activities arising from actual operating experiences. The interim surplus criteria would remain in effect for surplus determinations made through calendar year 2015, subject to five-year reviews concurrent with the LROC reviews. As noted in Section 1.4.1, implementation of interim surplus criteria would take into account the progress, or lack thereof, in the implementation of the CA Plan.

As noted above, the 70R operating strategy is not presented as an alternative for adoption. If an interim surplus criteria alternative is not implemented, the Secretary would determine surplus conditions using the same dynamic considerations currently used in the AOP.

Subsequent to the surplus determination for 2016, the interim surplus criteria would terminate and, in the absence of subsequently-specified surplus criteria, surplus determinations would be made by future Secretaries based on factors such as those that are considered in the AOP, as discussed in Chapter 1.

Because the selected baseline and the interim surplus criteria alternatives deal with operations, rather than construction or other physical Colorado River system changes, the alternatives are described below in terms of their operating rules. The Department and Reclamation intend to deliver water in accordance with Article II(B)2 of the Decree. The estimated volumes of surplus water projected to be available each year under baseline conditions and each alternative are tabulated to demonstrate the operation under the respective conditions. The projected volumes of surplus water vary over the interim period in response to various factors including the implementation of various components of the CA Plan.

A common element of all alternatives is that in years in which the *Field Working Agreement between the Bureau of Reclamation and the Army Corps of Engineers for Flood Control Operation of Hoover Dam and Lake Mead* requires releases greater than the downstream beneficial consumptive use demands, the Secretary shall determine a "flood control surplus" will be declared in that year. In such years, releases will be made to satisfy all beneficial uses within the United States (see the estimated amounts under Flood Control for each alternative), and up to an additional 200,000 af will be made available to Mexico under the Treaty.

2.3.1 NO ACTION ALTERNATIVE AND BASELINE CONDITION

2.3.1.1 APPROACH TO SURPLUS WATER DETERMINATION

As discussed above in Section 2.2.6, the 70R operating strategy is being used as a baseline to show possible future operating conditions in the absence of interim surplus criteria. The primary effect of simulating operation with the 70R operating strategy

would be that surplus conditions would only be determined when Lake Mead is nearly full.

2.3.1.2 70R Baseline Surplus Triggers

The 70R baseline strategy involves assuming a 70-percentile inflow into the system subtracting out the consumptive uses and system losses and checking the results to see if all of the water could be stored or if flood control releases would be required. If flood control releases would be required, additional water is made available to the Lower Basin states beyond 7.5 maf. The notation 70R refers to the specific inflow where 70 percent of the historical natural runoff is less than this value (17.4 maf) for the Colorado River basin at Lee Ferry.

The 70R strategy is illustrated on Figure 2-1, which shows the average trigger elevation of Lake Mead's water surface above which a surplus would be determined. In practice, the 70R surplus determination would not be based on the trigger line shown, but would be made during the fall of the preceding year using projected available system space.

The 70R trigger line rises from approximately 1199 feet msl in 2002 to 1205 feet msl in 2050. The gradual rise of the 70R trigger line shown in Figure 2-1 is the result of increasing water use in the Upper Basin. Under baseline conditions, when a surplus condition is determined to occur, surplus water would be made available to fill all water orders by holders of surplus water contracts in the Lower Division states in estimated amounts on Table 2-1.

Figure 2-1
Baseline Surplus Trigger Elevations

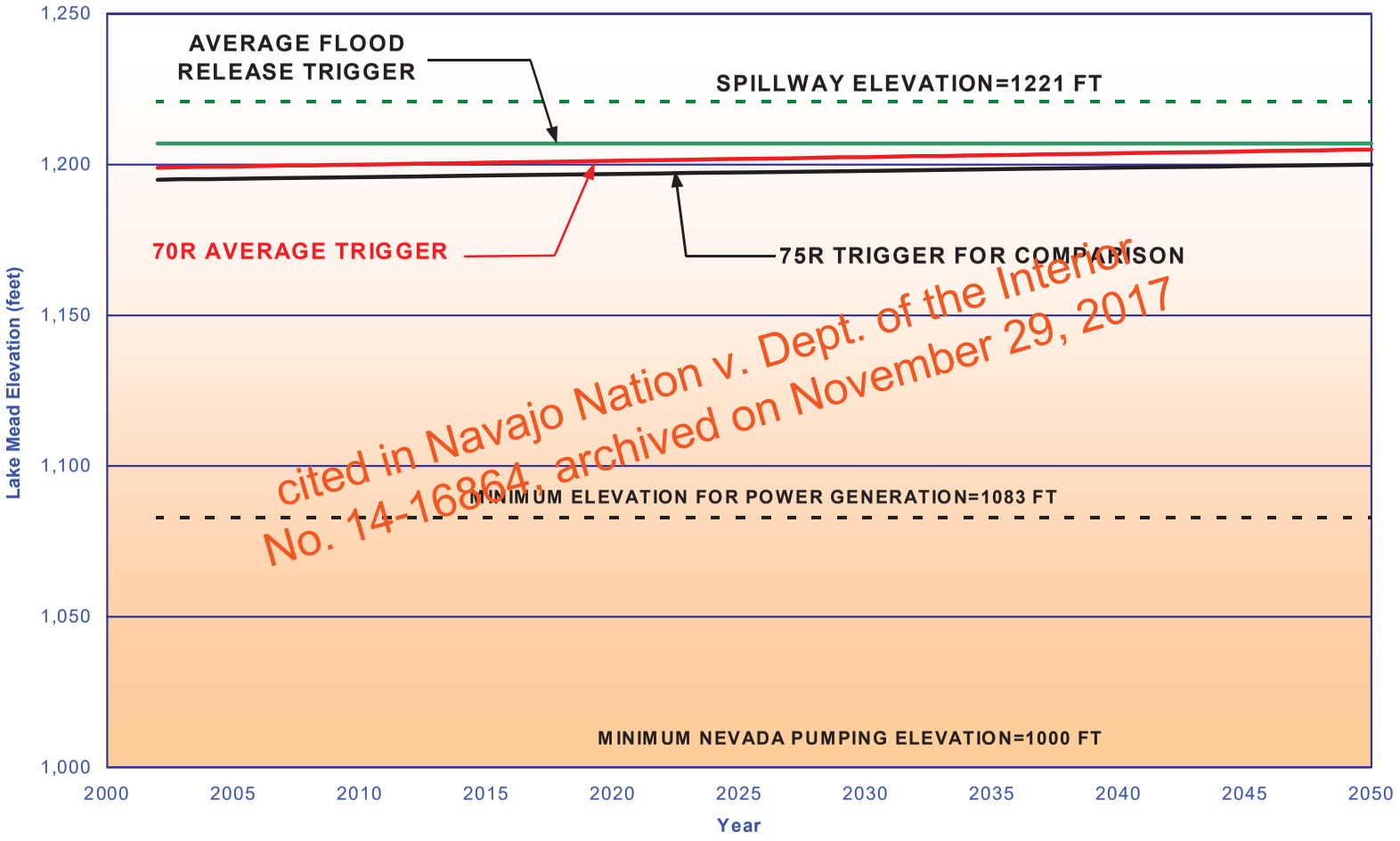


Table 2-1
Baseline Potential Surplus Water Supply
Unit : thousand acre-feet (kaf)

Year	Flood Control	70R Trigger
2002	1350	1350
2003	1350	1350
2004	1350	1350
2005	1350	1350
2006	1400	1400
2007	1450	1450
2008	1500	1500
2009	1550	1550
2010	1600	1600
2011	1600	1600
2012	1650	1650
2013	1650	1650
2014	1650	1650
2015	1700	1700
2016	1700	1700

2.3.2 BASIN STATES ALTERNATIVE (PREFERRED ALTERNATIVE)

Reclamation has identified the Basin States Alternative as the preferred alternative in this FEIS. The Basin States Alternatives is similar to, and based upon, information submitted to the Secretary by representatives of the governors of the states of Colorado, Wyoming, Utah, New Mexico, Arizona, Nevada and California. After receipt of this information (during the public comment period), Reclamation shared the submission with the public (through the *Federal Register* and Reclamation's surplus criteria web sites) for consideration and comment. Reclamation then analyzed the states' submission and crafted this additional alternative for inclusion in the FEIS. Some of the information submitted for the Department's review was outside of the scope of the proposed action for adoption of interim surplus criteria and was therefore not included as part of the Basin States Alternative (i.e., adoption of shortage criteria and adoption of surplus criteria beyond the 15-year period) as presented in this FEIS. With respect to the information within the scope of the proposed action, Reclamation found the Basin States Alternative to be a reasonable alternative and fully analyzed all environmental effects of this alternative in this FEIS. The identified environmental effects of the Basin States Alternative are well within the range of anticipated effects of the alternatives presented in the DEIS and do not affect the environment in a manner not already considered in the DEIS.

Reclamation selected the Basin States Alternative as its preferred alternative based on Reclamation's determination that it best meets all aspects of the purpose and need for the action, including the needs to remain in place for the entire period of the interim criteria, to garner support among the Basin States that will enhance the Secretary's ability to manage the Colorado River reservoirs in a manner that balances all existing needs for these precious water supplies, and to assist in the Secretary's efforts to insure that California water users reduce their over reliance on surplus Colorado River water.

Reclamation notes the important role of the Basin States in the statutory framework for administration of Colorado River Basin entitlements and the significance that a seven-state consensus represents on this issue. Thus, based on all available information, this alternative appears to be the most reasonable and feasible alternative.

2.3.2.1 Approach to Surplus Water Determination

The Basin States Alternative specifies ranges of Lake Mead water surface elevations to be used through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation were to decline, the amount of surplus water would be reduced. The interim criteria would be reviewed at five-year intervals with the LROC (and additionally as needed) and revised as needed based upon actual operational experience.

2.3.2.2 Basin States Alternative Surplus Triggers

The surplus determination elevations under the preferred alternative consist of the tiered Lake Mead water surface elevations listed below, each of which is associated with certain stipulations on the purposes for which surplus water could be used. The elevation tiers (also referred to as levels) are shown on Figure 2-2. They are as follows, proceeding from higher to lower water levels:

Tier 1 - 70R Line (approximately 1199 to 1201 feet msl)
Tier 2 - 1145 feet msl
Tier 3 - 1125 feet msl

Table 2-2 lists the estimated maximum annual amounts of surplus water that would be available to contractors for surplus water in the Lower Division states under the Basin States Alternative, when Lake Mead is at or above each trigger. The table also lists the estimated amounts of surplus water that would be available to the Lower Division states when flood control releases are required.

Figure 2-2
Basin States Alternative Surplus Trigger Elevations

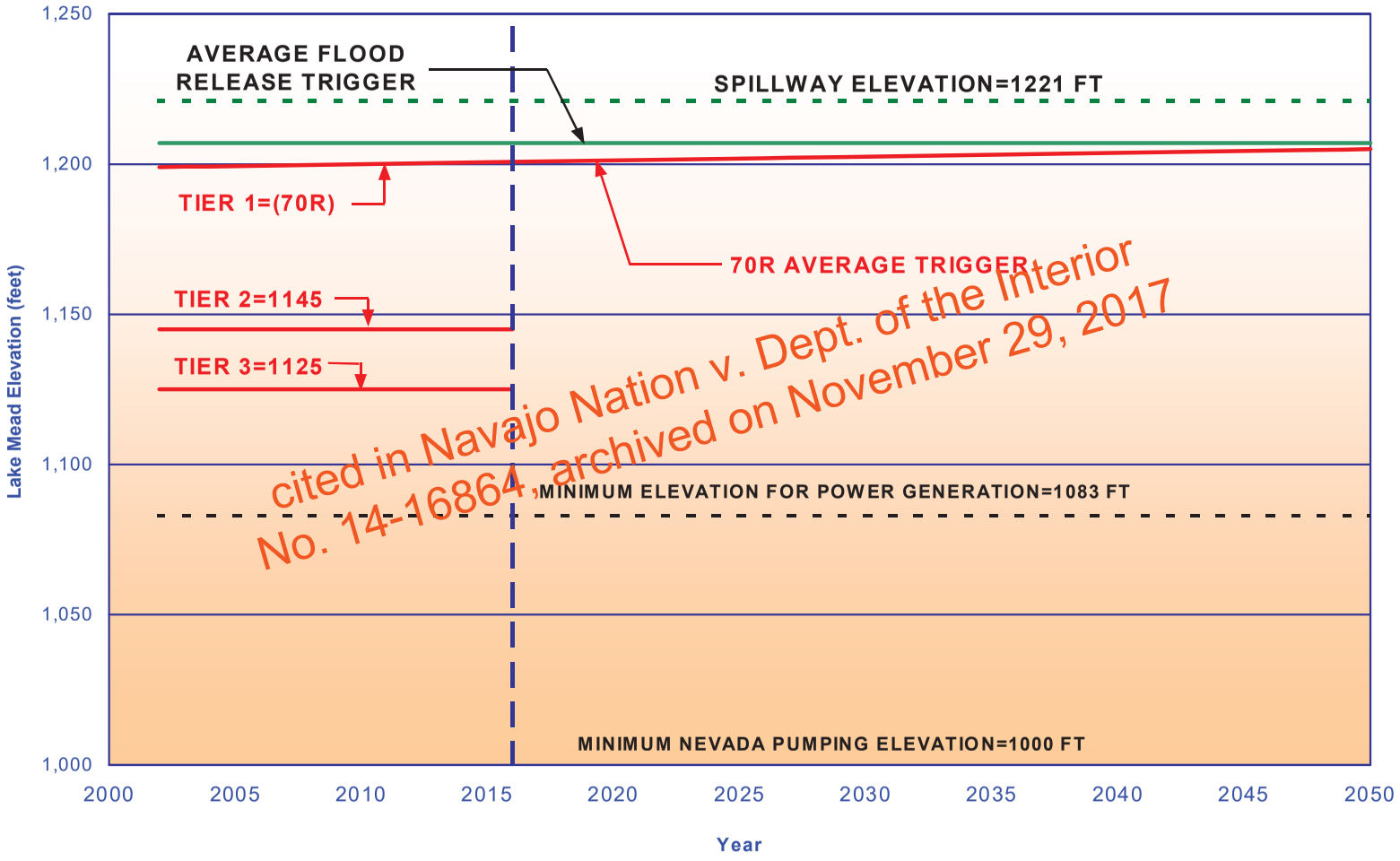


Table 2-2
Basin States Alternative Potential Surplus Water Supply
Unit: thousand acre-feet (kaf)

Year	Flood Control	Tier 1 (70R)	Tier 2 (1145 feet)	Tier 3 (1125 feet)
2002	1350	1150	650	200
2003	1350	1150	600	200
2004	1350	1050	550	150
2005	1350	1050	550	150
2006	1400	1050	500	150
2007	1450	1050	500	150
2008	1500	1100	450	150
2009	1550	1100	450	150
2010	1600	1150	450	150
2011	1600	1150	450	200
2012	1650	1200	450	200
2013	1650	1200	450	250
2014	1650	1200	450	250
2015	1700	1200	450	300
2016	1700	1200	450	300

The surplus amounts quantified for each tier in Table 2-2 are estimated annual quantities of water and are the Secretary's best estimate of the amounts of surplus water that could be made available during the 15-year period of the interim surplus guidelines. These estimates are based on the most current available data regarding projected Colorado River water use demands by existing contractors. The methodology that was used to prepare the demand schedules that underlie the surplus tables in this section is based upon the definitions of "domestic," "Direct Delivery Domestic Use" and "Off-Stream Banking," as used in the information submitted to the Secretary by the Colorado River Basin states (65 *Federal Register* 48531, 48535 [Aug. 8, 2000]). The quantities in each Tier are developed by using these definitions as set forth in the Basin States submission (see Table 2-2). Under these definitions, the quantity of estimated surplus quantities is based, in part, on supplying particular types of uses within the Lower Division states, with a higher priority for supplying domestic uses than that for irrigation uses or groundwater banking activities to supply future uses.

While the Secretary, as an initial matter, would make surplus water available in amounts consistent with the percentages identified in Article II(B)(2) of the Decree, it is expected that water orders from Colorado River contractors will be submitted to reflect forbearance arrangements made by Lower Division states and individual contractors. The Secretary will deliver water to contractors in a manner consistent with these arrangements, to the extent that the water orders from contractors reflect these arrangements. The Secretary expects to make the specified quantities of water available during the 15-year period. However, the precise annual surplus quantities will continue to be reviewed on an annual basis during the preparation of the AOP, as required by applicable federal law, based on actual operating experience and updated information on the demand for Colorado River water by Lower Division contractors.

2.3.2.1.1 Basin States Alternative Tier 1 (70R)

The Basin States Alternative Tier 1 Lake Mead surplus trigger elevations are based on the 70R strategy and range from approximately 1199 feet msl to 1201 feet msl. In years when the Secretary determines that water should be released for beneficial consumptive use to reduce the risk of potential flood control releases based on the 70R operating strategy, the Secretary would determine the quantity of surplus water available and allocate it as follows: 50 percent to California, 46 percent to Arizona and 4 percent to Nevada.

Regardless of the quantity of surplus water determined under Tier 1, surplus deliveries under Tier 2 (discussed below) would be met.

2.3.2.1.2 Basin States Alternative Tier 2 (1145 feet msl)

The Basin States Alternative Tier 2 Lake Mead surplus trigger elevation is 1145 feet msl. At or above this Tier 2 elevation (and below the Tier 1 elevation), surplus water would be available for use by the Lower Division states in the estimated amounts in Table 2-2.

2.3.2.1.3 Basin States Alternative Tier 3 (1125 feet msl)

The Basin States Alternative Tier 3 Lake Mead surplus trigger elevation is 1125 feet msl. At or above this Tier 3 elevation (and below the Tier 2 elevation), surplus water would be available for use by the Lower Division states in the estimated amounts on Table 2-2. At Lake Mead levels below the Tier 3 trigger surplus water would not be made available.

2.3.2.2 Draft Guidelines

Draft guidelines for implementation of the Basin States Alternative are presented in Attachment I. These guidelines describe in more detail the relationships between the implementation of interim surplus criteria under this alternative and the AOP process through which the Secretary would determine whether surplus water is available and how much is available.

2.3.3 FLOOD CONTROL ALTERNATIVE

2.3.3.1 Approach to Surplus Water Determination

Under the Flood Control Alternative, a surplus condition is determined to exist when flood control releases from Lake Mead are occurring or projected to occur in the subsequent year. The method of determining need for flood control releases is based on flood control regulations published by the Los Angeles District of the Corps and the Field Working Agreement between the Corps and Reclamation, which are discussed in Section 1.3.6, Flood Control Operation.

2.3.3.2 FLOOD CONTROL ALTERNATIVE SURPLUS TRIGGERS

Under the flood control strategy, a surplus is determined when the Corps flood control regulations require releases from Lake Mead in excess of downstream demand. The specific operating provisions are described in Section 1.3.6, Flood Control Operation. If flood control releases are required, surplus conditions are determined to be in effect. This strategy is illustrated on Figure 2-3, which shows the average Lake Mead water surface elevation that would trigger flood control releases. The average triggering elevation is a level line at approximately 1211 feet msl. In practice, flood control releases are not based on the average trigger line shown, but would be determined each month by following the Corps regulations. The graph is a visual representation to illustrate the differences between the alternatives. When a flood control surplus is determined, surplus water would be made available for all established uses by contractors for surplus water in the Lower Division states. Table 2-3 lists the annual amounts of surplus water estimated to be available under the Flood Control Alternative.

Table 2-3
Flood Control Alternative
Potential Surplus Water Supply
Unit: thousand acre-feet (kaf)

Year	Flood Control
2002	1350
2003	1350
2004	1350
2005	1350
2006	1400
2007	1450
2008	1500
2009	1550
2010	1600
2011	1600
2012	1650
2013	1650
2014	1650
2015	1700
2016	1700

2.3.4 SIX STATES ALTERNATIVE

2.3.4.1 APPROACH TO SURPLUS WATER DETERMINATION

The Six States Alternative specifies ranges of Lake Mead water surface elevations to be used through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation were to decline, the amount of surplus water would be reduced. The interim criteria would be reviewed at five-year intervals with the LROC and as needed based upon actual operational experience.

Figure 2-3
Flood Control Alternative Surplus Trigger Elevations

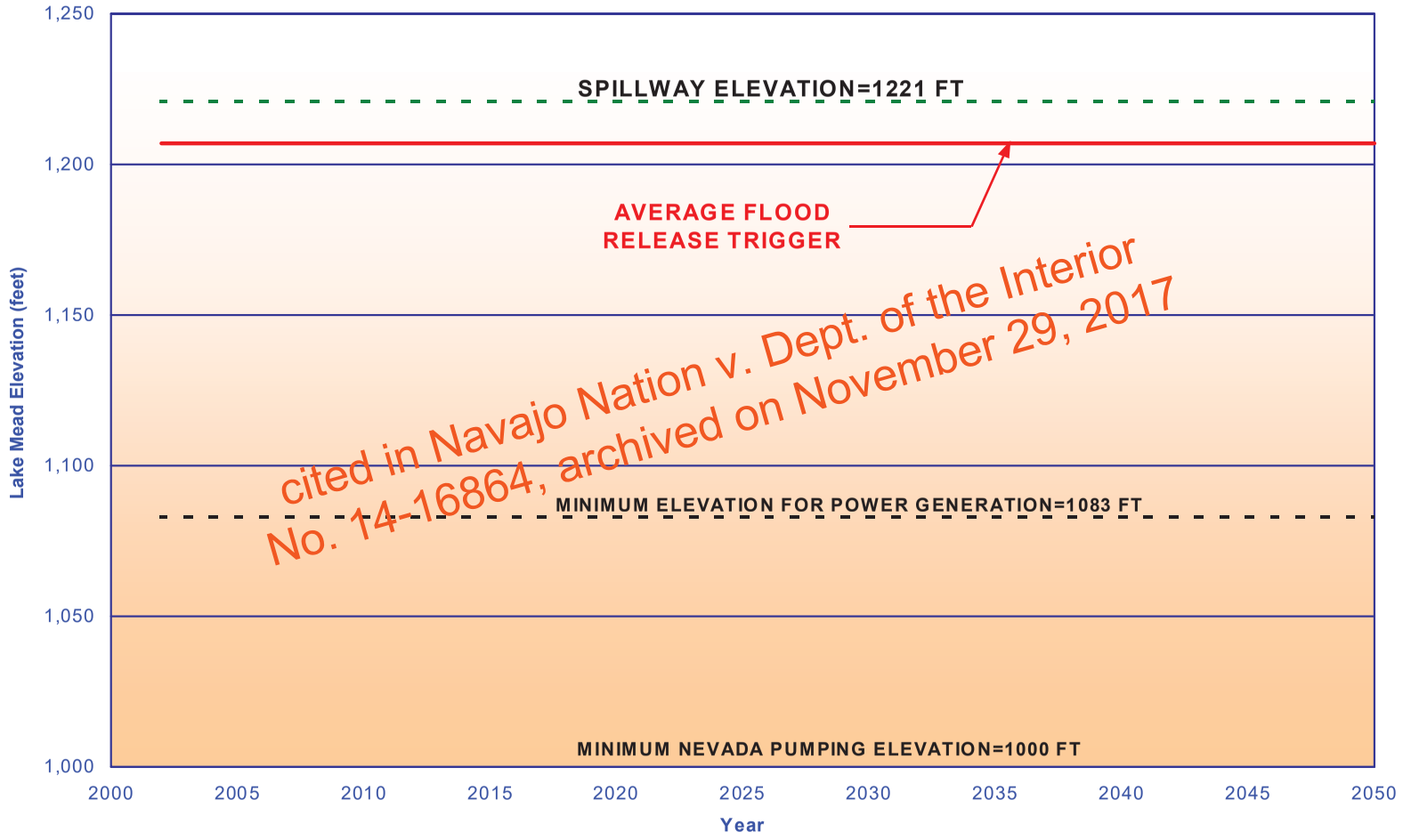
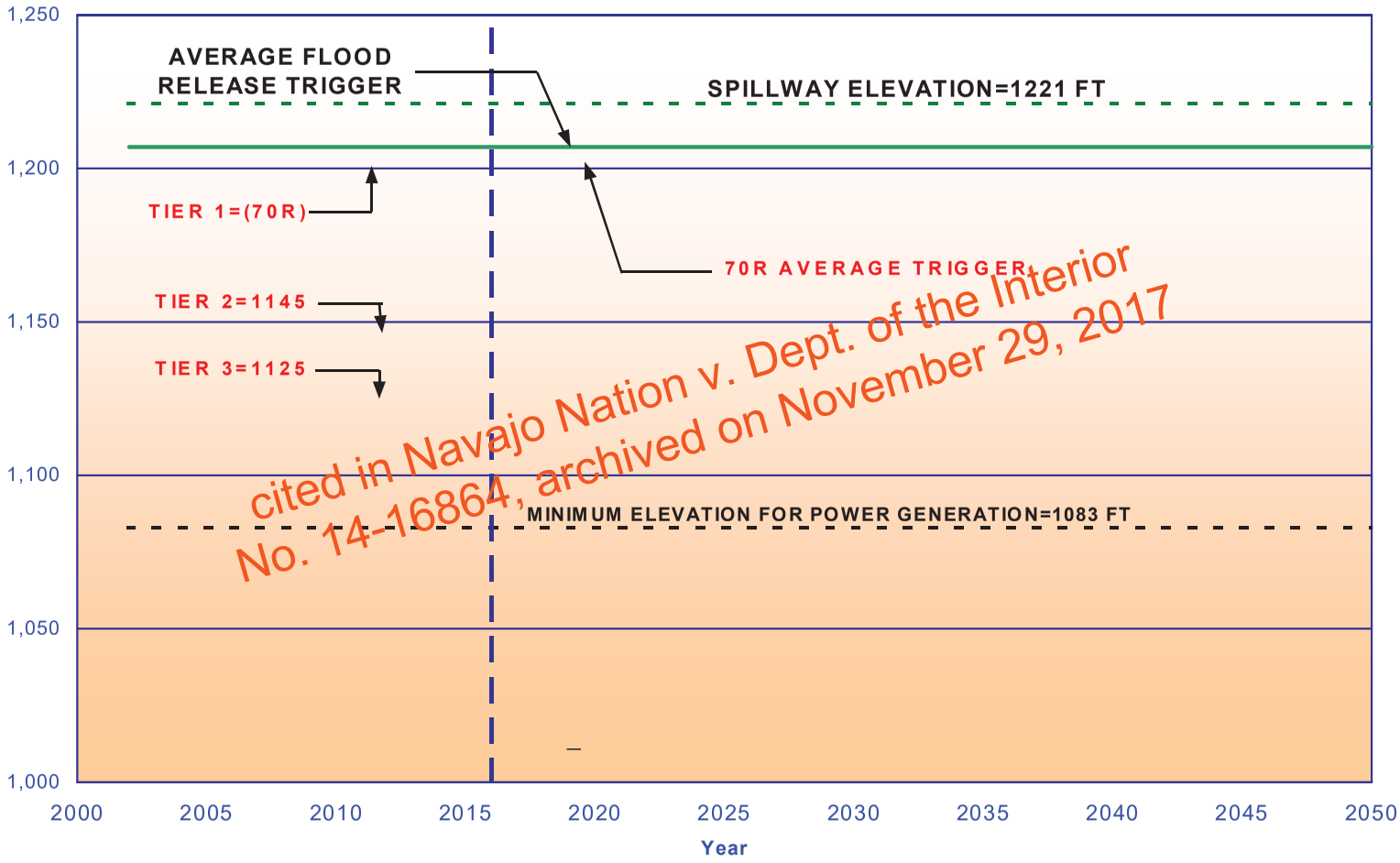


Figure 2-4
Six States Alternative Surplus Trigger Elevations



2.3.4.2 SIX STATES ALTERNATIVE SURPLUS TRIGGERS

The surplus determination elevations under the Six States Alternative consist of the tiered Lake Mead water surface elevations listed below, each of which is associated with certain stipulations on the purposes for which surplus water could be used. The tiered elevations are shown on Figure 2-4. They are as follows, proceeding from higher to lower water levels:

Tier 1 - 70R Line (approximately 1199 to 1201 feet msl)
Tier 2 - 1145 feet msl
Tier 3 - 1125 feet msl

The following sections describe the various tiers and the estimated amounts of surplus water available at those tiers under the Six States Alternative. When flood control releases are made, any and all beneficial uses would be met, including unlimited off-stream storage.

2.3.4.2.1 Six States Alternative Tier 1 (70R)

Six States Alternative Tier 1 Lake Mead surplus trigger elevations are based on the 70R strategy and range from approximately 1199 feet msl to 1201 feet msl during the interim period. When Lake Mead surface elevations are at or above the 70R line (and below the average flood release trigger line shown in Figure 2.4), surplus water would be available. Table 2-4 lists the estimated annual amounts of surplus water that would be available to the Lower Division states under the Basin States Alternative, when Lake Mead is at or above the Tier 1 trigger. The table also lists the estimated amounts of surplus water that would be available to the Lower Division states when flood control releases are required.

Table 2-4
Six States Alternative Potential Surplus Water Supply
Unit: thousand acre-feet (kaf)

Year	Flood Control	Tier 1	Tier 2	Tier 3
2002	1350	1350	600	350
2003	1350	1350	550	300
2004	1350	1350	500	250
2005	1350	1350	500	250
2006	1400	1400	450	200
2007	1450	1450	450	200
2008	1500	1500	450	150
2009	1550	1550	400	150
2010	1600	1600	400	150
2011	1600	1600	400	150
2012	1650	1650	400	150
2013	1650	1650	400	150
2014	1650	1650	400	150
2015	1700	1700	400	150
2016	1700	1700	400	150

2.3.4.2.2 Six States Alternative Tier 2 (1145 feet msl)

The Six States Alternative Tier 2 Lake Mead surplus trigger elevation is 1145 feet msl. At or above this Tier 2 elevation (and below the Tier 1 elevation), surplus water would be available for use by the Lower Division states in the estimated amounts on Table 2-4.

2.3.4.2.3 Six States Alternative Tier 3

The Six States Alternative Tier 3 Lake Mead surplus trigger elevation is 1125 feet msl. At or above this Tier 3 elevation (and below the Tier 2 elevation). Surplus water would be available for use by the Lower Division states in the estimated amounts on Table 2-4.

When Lake Mead water levels are below the Tier 3 trigger elevation, surplus water would not be available.

2.3.5 CALIFORNIA ALTERNATIVE

2.3.5.1 Approach to Surplus Water Determination

The California Alternative specifies Lake Mead water surface elevations to be used for the interim period through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation declines, the amount of surplus water would be reduced.

2.3.5.2 California Alternative Surplus Triggers

The Lake Mead elevations at which surplus conditions would be determined under the California Alternative are indicated by a series of tiered, sloping lines from the present to 2016. Each tiered line would be coupled with limitations on the amount of surplus water available at that tier. Figure 2-5 shows the structure of these tiered lines. Each tier is defined as a trigger line that rises gradually year by year to 2016, in recognition of the gradually increasing water demand of the Upper Division states. The elevations associated with the three tiers are as follows:

Tier 1 - 1160 feet msl to 1166 feet msl
Tier 2 - 1116 feet msl to 1125 feet msl
Tier 3 - 1098 feet msl to 1102 feet msl

Each tier under the California Alternative would be subject to adjustment during the interim period based on changes in Upper Basin demand projections or other factors during the five-year reviews or as a result of actual operating experience. The following sections describe the California Alternative tiers. When flood control releases are made, any and all beneficial uses would be met, including unlimited off-stream storage.

2.3.5.2.1 California Alternative Tier 1

California Alternative Tier 1 Lake Mead surplus trigger elevation increases from an initial elevation of 1160 feet msl to 1166 feet msl at the end of the interim period (based on Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 1 trigger line would permit surplus water deliveries to the Lower Division states in the estimated amounts on Table 2-5. The table also lists the estimated amounts of surplus water that would be available to the Lower Division states when flood control releases are required.

Table 2-5
California Alternative Potential Surplus Water Supply
Unit: thousand acre-feet (kaf)

Year	Flood Control	Tier 1	Tier 2	Tier 3
2002	1350	1350	650	550
2003	1350	1350	600	500
2004	1350	1350	550	400
2005	1350	1350	550	400
2006	1400	1400	500	400
2007	1450	1450	450	350
2008	1500	1500	450	350
2009	1550	1550	450	350
2010	1600	1600	400	300
2011	1600	1600	400	300
2012	1650	1650	400	300
2013	1650	1650	400	300
2014	1650	1650	400	300
2015	1700	1700	400	300
2016	1700	1700	400	300

2.3.5.2.2 California Alternative Tier 2

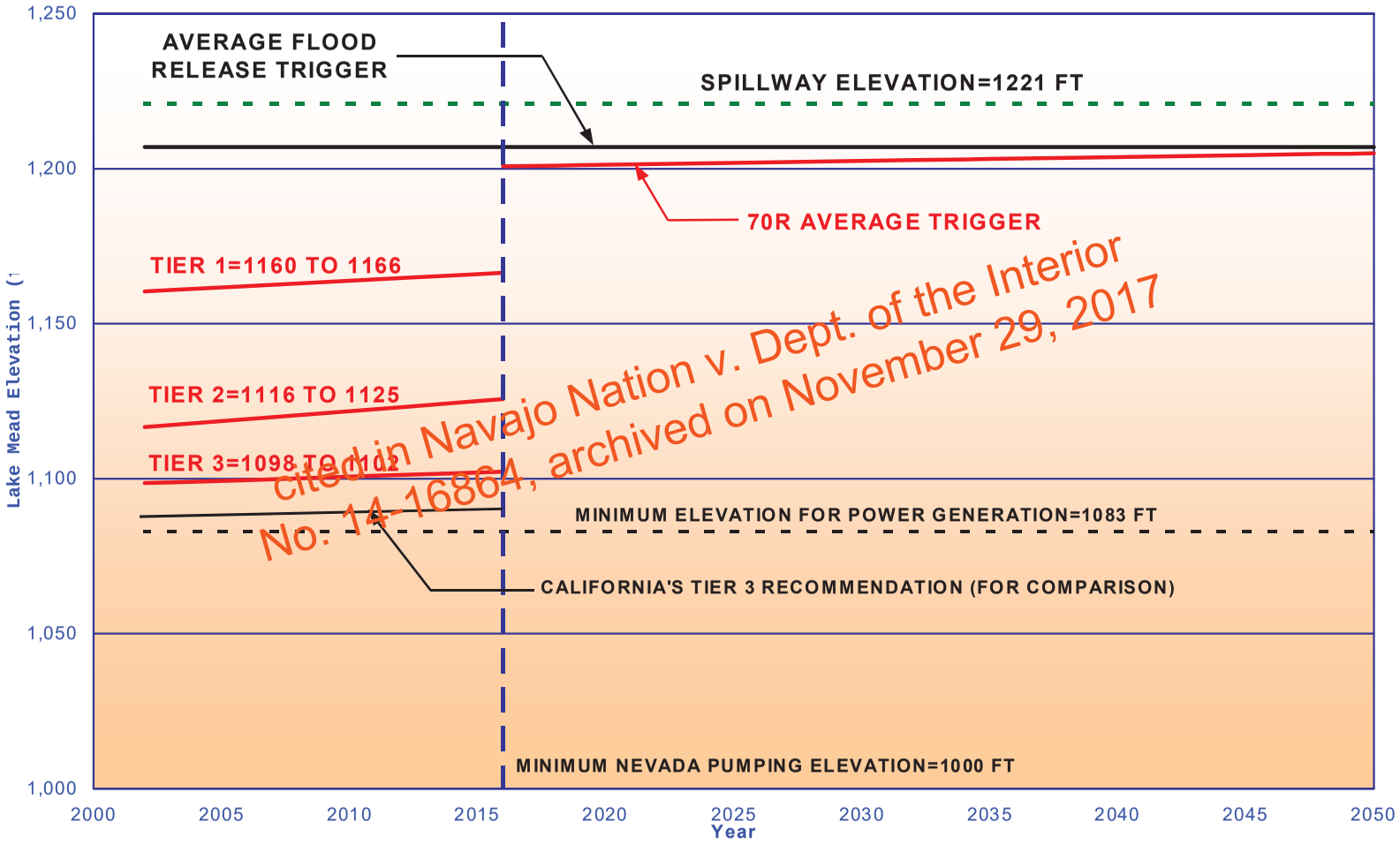
California Alternative Tier 2 Lake Mead surplus trigger elevation increases from 1116 feet msl to 1125 feet msl (based on Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 2 line (and below the Tier 1 line) would permit surplus water diversions for use by the Lower Division states in the estimated amounts on Table 2-5.

2.3.5.2.3 California Alternative Tier 3

California Alternative Tier 3 trigger elevation increases from 1098 feet msl to 1102 feet msl (based on Upper Basin demand projections). Lake Mead water surface elevations at or above the Tier 3 line (and below the Tier 2 line) would permit surplus water diversions for use by the Lower Division states in the estimated amounts on Table 2-5.

When Lake Mead water levels are below the Tier 3 trigger elevation, surplus water would not be made available.

Figure 2-5
California Alternative Surplus Trigger Elevations



2.3.6 SHORTAGE PROTECTION ALTERNATIVE

2.3.6.1 APPROACH TO SURPLUS WATER DETERMINATION

The Shortage Protection Alternative is based on maintaining an amount of water in Lake Mead necessary to provide a normal annual supply of 7.5 maf for the Lower Division, 1.5 maf for Mexico and storage necessary to provide an 80 percent probability of avoiding future shortages. The modeling assumptions for shortage protection are discussed in Section 3.3.3.4, Lake Mead Water Level Protection Assumptions.

2.3.6.2 SURPLUS TRIGGERS

The surplus triggers under this alternative range from an approximate Lake Mead initial elevation of 1126 feet msl to an elevation of 1155 feet msl at the end of the interim period, as shown on Figure 2-6. At Lake Mead elevations above the surplus trigger, surplus conditions would be determined to be in effect and surplus water would be available for use in the Lower Division states in the estimated amounts on Table 2-6. Below the trigger elevation, surplus water would not be made available.

Table 2-6
Shortage Protection Alternative
Potential Surplus Water Supply
Unit: thousand acre-feet (kaf)

Year	Flood Control	Surplus Amount
2002	1350	1350
2003	1350	1350
2004	1350	1350
2005	1350	1350
2006	1400	1400
2007	1450	1450
2008	1500	1500
2009	1550	1550
2010	1600	1600
2011	1600	1600
2012	1650	1650
2013	1650	1650
2014	1650	1650
2015	1700	1700
2016	1700	1700

2.4 SUMMARY TABLE OF IMPACTS

Table 2-7 presents a summary of the potential effects of the baseline operation and the interim surplus alternatives. Chapter 3 contains detailed descriptions of these effects.

Figure 2-6
Shortage Protection Alternative Trigger Elevations

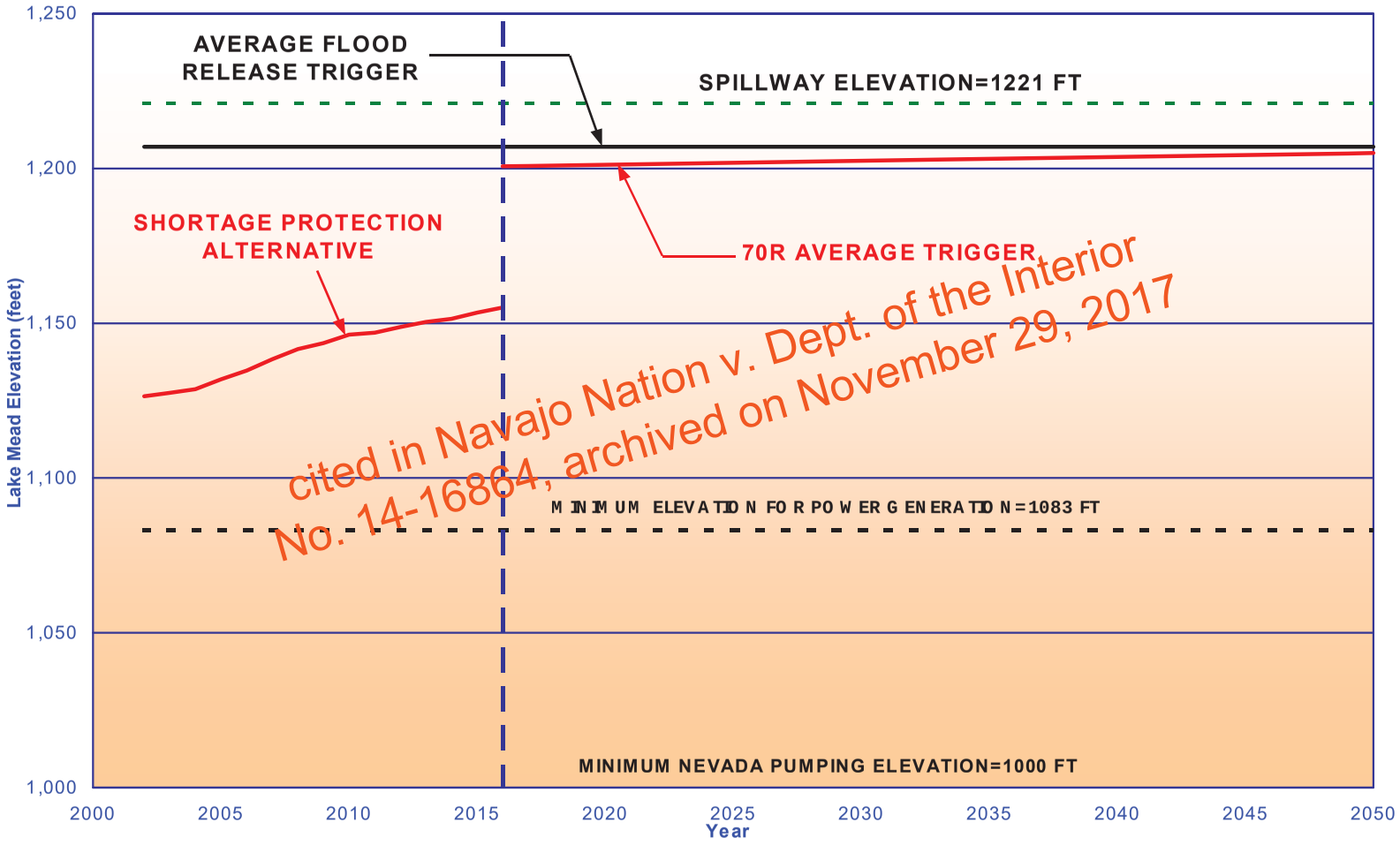


Table 2-7
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Reservoirs Elevations and River Flows		
Lake Powell Water Surface Elevations Potential changes in Lake Powell water surface elevations.	Reservoir water levels exhibit a gradual declining trend during the interim surplus criteria period as a result of increasing Upper Division states consumptive use. The median water surface elevation in 2016 is 3665 feet msl. The probability of Lake Powell being full[3] in 2016 is 27%. After 2016, median levels stabilize, then rise and fall slightly, due to 602(a) storage requirements and less frequent equalization releases.	Median Elevations in 2016 for each of the alternatives are as follows: Basin States 3664 feet msl Flood Control 3665 feet msl Six States 3664 feet msl California 3660 feet msl Shortage Protection 3659 feet msl After 2016, Lake Powell water levels under all five alternatives tend to stabilize similar to baseline conditions. Water levels under the Basin States, Flood Control, Six States, California and Shortage Protection alternatives tend to converge with the baseline conditions by about year 2030.
Lake Mead Water Surface Elevations Potential changes in Lake Mead water surface elevations.	Reservoir water levels exhibit a gradual declining trend during the interim surplus criteria period as a result of Lower Basin consumptive use exceeding long-term inflow. The median water surface elevation in 2016 is 1162 feet msl. After 2016, median water surface elevations continue to decline, although at a lower rate, due to less frequent Lower Basin surplus deliveries.	Median Elevations in 2016 for each of the alternatives are as follows: Basin States 1143 feet msl Flood Control 1162 feet msl Six States 1146 feet msl California 1131 feet msl Shortage Protection 1130 feet msl After 2016, median surface elevations continue to decline. By about 2035, all alternatives converge to elevations similar to baseline conditions.
River Flows Glen Canyon and Hoover Dam releases and flows downstream of Lake Mead.	Flows downstream of Glen Canyon Dam would be managed in accordance with the 1995 Glen Canyon Dam EIS and the 1996 ROD. Flows downstream of Hoover Dam are governed by downstream demand or Hoover Dam flood control releases.	Flood Control Alternative: Similar to baseline conditions. Other alternatives: Flows below Glen Canyon Dam would be similar to baseline conditions. Flows from Hoover Dam to Parker Dam would be moderately higher until 2016 because of surplus deliveries. After 2016, flows would be similar to baseline conditions.

Table 2-7
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action			Effects of Alternatives[2]
Water Supply				
California Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	100% 100%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2016. The probability is similar to baseline conditions from 2017 through 2050. Deliveries less than the normal apportionment (4.4 mafy) do not occur under the alternatives at any time through 2050.
	Surplus:	2002 through 2016 2017 through 2050	47% 21%	
	Shortage:	2002 through 2016 2017 through 2050	0% 0%	
Arizona Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	>96% 50%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2016 under the California and Shortage Protection alternatives and slightly lower (26%) under the Basin States and Six States alternatives. The probability of surplus under the alternatives is about the same as baseline from 2017 to 2050. The probability of shortage condition deliveries under the alternatives is slightly higher (7% to 14%) through 2016. From 2017 to 2050, the probability of shortages under the alternatives is similar to baseline conditions.
	Surplus:	2002 through 2016 2017 through 2050	29% 21%	
	Shortage:	2002 through 2016 2017 through 2050	< 4% 50%	
Nevada Water Supply Probabilities of normal, surplus and shortage[4] conditions.	Normal:	2002 through 2016 2017 through 2050	96% 50%	Flood Control Alternative: Similar to baseline conditions. Other Alternatives: Greater probability of surplus through 2015; same as baseline from 2017 to 2050. The probability of shortage condition deliveries is slightly higher (7% to 14%) for the alternatives through 2016. From 2017 to 2050, the probability of shortage condition deliveries is higher (3% to 5%) under the alternatives.
	Surplus:	2002 through 2016 2017 through 2050	47% 21%	
	Shortage:	2002 through 2016 2017 through 2050	< 4% 50%	
Mexico Treaty Delivery Probabilities of meeting Treaty delivery obligations.	Normal:	2002 through 2016 2017 through 2050	100% 100%	The Flood Control Alternative would provide slightly higher (1%) probabilities of surplus than under baseline conditions through 2016. The rest of the alternatives provide slightly lower (3% to 7%) probabilities of surplus through 2016 and about the same level as baseline through 2050. Deliveries less than the treaty apportionment (1.5 mafy) do not occur under the alternatives at any time through 2050.
	Surplus:	2002 through 2016 2016 through 2050	26% 19%	
	Shortage:	2002 through 2016 2017 through 2050	0% 0%	

Table 2-7
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Water Quality		
Colorado River Salinity Potential change in salinity below Hoover Dam.	Baseline projections assume compliance with numeric criteria along the river. The Basin States are committed to meeting the numeric criteria.	Modeling indicates potential for slight reductions in salinity under each alternative as compared to baseline.
Lake Mead Water Quality and Las Vegas Water Supply Contaminant concentrations in Boulder Basin of Lake Mead, in proximity to the SNWS intakes at Saddle Island.	Increased potential for lower Lake Mead levels and increased inflow channel lengths under baseline projections could increase potential of elevated contaminant concentrations.	The alternatives, except the Flood Control Alternative, result in slightly increased potential for increased contaminant concentrations in Boulder Basin, due to greater potential for lower Lake Mead levels than under baseline conditions.
Flow-Related Issues		
Beach/Habitat-Building Flow Releases Probability of BHBF release conditions from Glen Canyon Dam.	The average annual probability of BHBF releases is 16% through 2016 and 14% from 2017 through 2050.	The probability under the alternatives is typically less than under baseline conditions during the interim period, and converges with baseline conditions thereafter.
Low Steady Summer Flows Probability of requisite conditions for low steady summer flow releases from Glen Canyon Dam.	The average annual probability of conditions requisite for low steady summer flows is 38% through 2016 and 62% from 2017 through 2050.	The probability under the alternatives is typically less than under baseline conditions during the first seven years and similar to or slightly greater than under baseline conditions thereafter.
Flooding Downstream of Hoover Dam Probability of damaging flows below Davis and Parker Dams.	Average annual probability from 2002 through 2016: Davis Dam 9% Parker Dam 10% Average annual probability from 2017 through 2050: Davis Dam 5% Parker Dam 6%	The probability under the Flood Control Alternative is slightly greater than under baseline conditions. The probability under other alternatives is slightly less than under baseline conditions.
Aquatic Resources		
Lake Habitat and Sport Fisheries Potential effects on Lake Mead and Lake Powell fisheries and associated aquatic habitat.	Species are adapted to fluctuating reservoir levels. Therefore, increased potential for lower Lake Mead and Lake Powell surface levels is not expected to adversely affect aquatic species.	Compared with baseline conditions, slightly increased potential for higher reservoir levels under the Flood Control Alternative and increased potential for lower reservoir levels under the other alternatives would not be expected to result in substantial changes to lake habitat.

Table 2-7
Summary of Potential Effects of Implementing Interim Surplus Criteria[1]

Resource/Issue	Baseline Conditions/No Action	Effects of Alternatives[2]
Special-Status Species		
Special-Status Plants Potential effects on special-status plants for areas influenced by Lake Powell and Lake Mead water levels.	Under baseline conditions, special-status plant species would continue to be affected by fluctuating water levels, which would periodically expose and inundate areas where the plants occur.	Although reservoir elevations would differ, the effects of all alternatives would be similar to baseline conditions.
Special-Status Wildlife Potential effects on special-status wildlife species associated primarily with potential effects on riparian habitat at the Lake Mead and Virgin River deltas, and the lower Grand Canyon.	Under baseline conditions, increased potential over time for lower reservoir levels could increase potential for development of temporary riparian habitat at the deltas, which would benefit special-status wildlife species that utilize such habitat.	The Flood Control Alternative would have slightly lower potential, while the other alternatives would have increased potential, for lower reservoir elevations and associated potential increases in delta habitat.
Special-Status Fish Potential effects of Lake Mead and Lake Powell reservoir level changes on special-status fish species.	Under baseline conditions, increased potential for lower elevations is not expected to have effects on special-status species fish differently than those that occur at present.	Changes in potential for lower reservoir levels under the various alternatives would not change potential for effects.
Recreation		
Reservoir Marinas/Boat Launching Potential effects on shoreline recreation facilities from changes in Lake Mead and Lake Powell surface elevations.	Baseline condition projections indicate increased potential for reservoir levels lower than those considered within the normal operating range that some existing facilities may be able to accommodate. Such occurrence would likely result in modification of facilities to accommodate lower surface elevations.	The Flood Control Alternative has a slightly decreased potential for lower reservoir levels; each of the other alternatives have increased potential for lower levels and necessary relocations.
Reservoir Boating/Navigation Potential effects on reservoir boating that may result from changes in Lake Mead and Lake Powell surface elevations.	Baseline condition projections indicate an increased potential for the occurrence of lower Lake Mead and Lake Powell reservoir levels, which may result in potential increases in navigation hazards and decreased safe boating capacity (due to decreased reservoir surface area).	The Flood Control Alternative has slightly lower potential, and each of the other alternatives have higher potential, for each of navigation hazards and reduced carrying capacity.
River and Whitewater Boating Potential effects on river boating at Lake Powell and Lake Mead inflow areas.	Boaters may have reduced take-out opportunities due to increased potential for lower reservoir surface elevations.	The Flood Control Alternative has lower potential, and each of the other alternatives have increased potential, for reduced take-out opportunities resulting from lower reservoir elevations.

Reservoir Sport Fishing Potential effects on sport fishing in Lake Mead and Lake Powell.	Potential effects on sport fisheries are minimal under baseline conditions.	Changes in reservoir elevations under each of the alternatives would not be expected to adversely affect sport fisheries or fishing in either reservoir.
Recreation Facilities Relocation Costs Increased costs associated with relocating shoreline facilities to remain in operation at lower reservoir elevations.	Baseline condition projections indicate increased relocation costs associated with future increased potential for lower reservoir levels.	The Flood Control Alternative is similar to baseline conditions. Other alternatives have greater potential for increased relocation costs, based on an average cost per foot associated with relocating facilities.
Energy Resources		
Hydroelectric Power Production Potential for changes in energy production at Glen Canyon and Hoover powerplants.	Glen Canyon Powerplant average annual energy production: 4532 GWh through 2016; 4086 GWh from 2017 through 2050. Hoover Powerplant average annual energy production: 4685 GWh through 2016; 3903 GWh from 2017 through 2050.	The Flood Control Alternative is similar to baseline conditions. Average annual power production under the other alternatives is greater than under baseline conditions for the first six to eight years, then is less for the remaining years. Averaged from 2002 to 2050, Glen Canyon annual power production is from 12 to 30 GWh less than baseline conditions, while Hoover power production is from 51 to 127 GWh less.
Pumping Power Needs for SNWS Potential change in the cost of power to pump Lake Mead water through the SNWS.	Future lower average Lake Mead water levels would require more energy and increased pumping costs for the SNWS intake.	The increase over baseline conditions of annual pumping costs for each alternative follows: Basin States $229,395 Flood Control $ 32,685 Six States $214,779 California $544,843 Shortage Protection $532,635

Intake Energy Requirements at Lake Powell Potential change in the cost of power to pump Lake Powell water to the Navajo Generating Station and the City of Page.	Future lower average Lake Powell water levels would require more energy and increased pumping costs for the Navajo Generating Station and the City of Page.	The increase over baseline conditions of annual pumping costs for each alternative follows: **Navajo Generating Station** Basin States $2,216 Flood Control $ 0 Six States $2,129 California $4,651 Shortage Protection $4,660 **City of Page** Basin States $ 529 Flood Control $ 0 Six States $ 508 California $1,110 Shortage Protection $1,112
Air Quality		
Fugitive Dust Emissions from Exposed Reservoir Shoreline Potential for fugitive dust emissions from shoreline exposure at Lake Mead and Lake Powell.	Increased potential for lower reservoir levels would increase potential for shoreline exposure under baseline conditions. Increases in fugitive dust emissions would be minimal due to low emission potential of shoreline.	Slightly decreased shoreline exposure under Flood Control Alternative would lower fugitive dust emission potential. Other alternatives would have slightly increased potential for increased fugitive dust emissions. Minimal changes in area-wide fugitive dust emissions would be expected.
Visual Resources		
Visual Attractiveness of Reservoir Scenery, Lake Mead and Lake Powell Potential effects of lower reservoir elevations on scenic quality.	Increased probability of temporary degradation in visual attractiveness of shoreline vistas resulting from increasing potential for lower water levels in Lake Mead and Lake Powell.	Flood Control Alternative: Same as baseline conditions. Other alternatives: Higher probability of degradation of visual attractiveness through 2016 due to accelerated decline of minimum reservoir levels.
Cultural Resources		
Effects on Historic Properties in Operational Zone of Reservoir and River Reaches.	Not significant due to past water level fluctuations. Impacts have already occurred.	Not significant due to past water level fluctuations. Impacts have already occurred.
Indian Trust Assets		
Effects on water supply for Indian Tribes and Communities	The water available to members of Ten Tribes Partnership would not be affected by future changes under baseline conditions. There is a probability of shortages of CAP priority water for tribes in central Arizona.	No effect on water available to members of Ten Tribes Partnership. Greater probability of shortages of CAP priority water for tribes in central Arizona under all alternatives with the exception of the Flood Control Alternative.

Environmental Justice				
Exposure of Minority or Low Income Communities to Health or Environmental Hazards	No effects are anticipated.			No effects anticipated.
Transboundary Effects				
Treaty Water Delivery Obligations Probabilities of meeting Treaty delivery obligations	Normal:	2002 through 2016 2017 through 2050	100% 100%	The Flood Control Alternative would provide slightly higher (1%) probabilities of surplus than under baseline conditions 2016. The rest of the alternatives provide slightly lower (3% to 7%) probabilities of surpluses through 2016 and about the same level as baseline through 2050. Deliveries less than the treaty apportionment (1.5 mafy) do not occur under the alternatives at any time through 2050.
	Surplus:	2002 through 2016 2016 through 2050	26% 19%	
	Shortage:	2002 through 2016 2017 through 2050	0% 0%	
Flow Below Morelos Dam Amount of excess flow that may reach the Colorado River delta.	Probability of excess flows below Morelos Dam would gradually decline under baseline conditions.			Flood Control Alternative: Similar to baseline. Other alternatives: Small reduction in probability of excess flows.
Potential Effects on Species and Habitat in Mexico	Probability of excess flows below Morelos Dam would gradually decline.			Under the Basin States Alternative there would be no effect on desert pupfish, Yaquita, Yuma clapper rail, California black rail, Clarks grebe; and there is not likely to be any adverse affect on Tinaja, Southwestern willow flycatcher, Yellow-billed cuckoo, Elf owl or Bell's vireo.

1. Effects identified are based on probabilities developed through modeling of possible future conditions through 2050, discussed in detail in Chapter 3.
2. In general, the differences between the alternatives and baseline conditions would be greatest at or near 2016, the year in which the interim surplus criteria would terminate.
3. Lake Powell is considered to be essentially full when the lake elevation reaches 3695 feet msl (5 feet below the top of the spillway gates).
4. Probabilities of shortage are based on the modeling assumption of protecting a Lake Mead elevation of 1083 feet msl. There are no established shortage criteria for the operation of Lake Mead.

CHAPTER THREE

AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

Chapter 3 presents the analysis conducted and identifies potential effects that could occur as a result of implementation of the interim surplus criteria alternatives under consideration. Section 3.1 describes the: 1) structure of the resource sections in this chapter; 2) role of modeling in the analysis; 3) baseline used for measuring potential effects of the alternatives; 4) general approach used for determining potential effects; 5) period of analysis; and 6) environmental commitments associated with interim surplus criteria.

Section 3.2 presents a general discussion of the geographic area within which potential effects of the interim surplus criteria were analyzed, and Section 3.3 describes the modeling methods and general results of Colorado River system modeling. The remaining sections of Chapter 3 present resource-specific analyses of potential effects using information obtained from the modeling.

3.1.1 STRUCTURE OF RESOURCE SECTIONS

Beginning with Section 3.4, the sections in this chapter each present a general resource category, such as water supply, recreation and aquatic resources. Within each resource category is contained analyses of one or more specific issues identified for consideration through scoping, public review and comment, and internal review. A discussion of the methodology, affected environment and environmental consequences is provided for each issue. Environmental commitments are proposed for impacts to various resource issues as appropriate.

Methodology discussions identify the specific methods used for determining the affected environment and potential environmental consequences of the alternatives. The affected environment discussions then identify the specific context within which the issue being analyzed exists. This includes a discussion of general environmental characteristics associated with each issue, as well as important Colorado River system conditions that may be associated with each issue. Finally, the potential effects of interim surplus criteria compared to baseline conditions (as discussed in more detail below) are presented in the environmental consequences discussions.

3.1.2 USE OF MODELING TO IDENTIFY POTENTIAL FUTURE COLORADO RIVER SYSTEM CONDITIONS

To determine the potential effects of the interim surplus criteria alternatives, modeling of the Colorado River system was conducted (a complete description of the modeling

procedure is included in Section 3.3). Modeling provides projections of potential future Colorado River system conditions (i.e., reservoir surface elevations, river flows, salinity, etc.). The modeling results allow a comparison of potential future conditions under the various interim surplus criteria alternatives and baseline conditions. As such, much of the analyses contained within this FEIS are based upon potential effects of changed flows and water levels within the Colorado River and mainstream reservoirs.

3.1.3 BASELINE CONDITIONS

As discussed in Chapter 2, the No Action Alternative does not provide consistent specific criteria for determining surplus conditions. As such, it is not possible to precisely model the No Action Alternative. However, in order to provide a reasonable analytical projection of potential future system conditions without interim surplus criteria, a baseline surplus strategy (70R) was utilized. This baseline represents definable surplus criteria based on recent operational decisions. The 70R strategy is based upon recent secretarial operating decisions and was modeled to develop a projection of baseline conditions for comparison with the alternatives in this FEIS.

3.1.4 IMPACT DETERMINATION

The analysis of potential effects for each issue considered is based primarily upon the results of modeling. Following the identification of conditions important to each issue, the potential effects of various system conditions over the general range of their possible occurrence (as identified by the range of modeling output for various parameters) are identified for each issue. The potential effects of the various interim surplus criteria alternatives are then presented in terms of the incremental differences in probabilities (or projected circumstances associated with a given probability) between baseline conditions and the alternatives.

3.1.5 PERIOD OF ANALYSIS

This FEIS addresses interim surplus criteria that would be used during the years 2001 through 2015 for determining whether surplus water would be available during the years 2002 through 2016. Due to the potential for effects beyond the 15-year interim period, the modeling and impact analyses extend through the year 2050. It is important to note that modeling output and associated impact analyses become more uncertain over time as a result of increased uncertainty of future system conditions (including hydrologic conditions), as well as uncertainty with regard to future operational decisions that will affect circumstances within the Colorado River system.

3.1.6 ENVIRONMENTAL COMMITMENTS

As discussed, impacts identified in Chapter 3 are associated with changes in the difference between probabilities of occurrence for specific resource issues under study when comparing the action alternatives to baseline conditions. Reclamation has

determined that most of the potential impacts identified are not of a magnitude that would require specific mitigation measures to reduce or eliminate their occurrence because the small changes in probabilities of occurrence are within Reclamation's current operational regime and authorities under applicable federal law. However, in recognition of potential effects that could occur under baseline conditions or with implementation of the interim surplus criteria alternatives under consideration, Reclamation has developed a number of environmental commitments that would be undertaken if interim surplus criteria are implemented. These commitments are described in relevant resource sections of this Chapter and in Section 3.17.

3.2 POTENTIALLY AFFECTED AREA

Interim surplus criteria could affect the operation of the Colorado River system (i.e., reservoir levels and river flow volumes) as a result of surplus determinations and associated water deliveries that may not have occurred in the absence of such criteria. This section describes the general geographic scope in which specific issues and potential effects associated with the interim surplus criteria alternatives were considered in this FEIS. Also discussed are the AMP, and how the program influences flows between Lake Powell and Lake Mead.

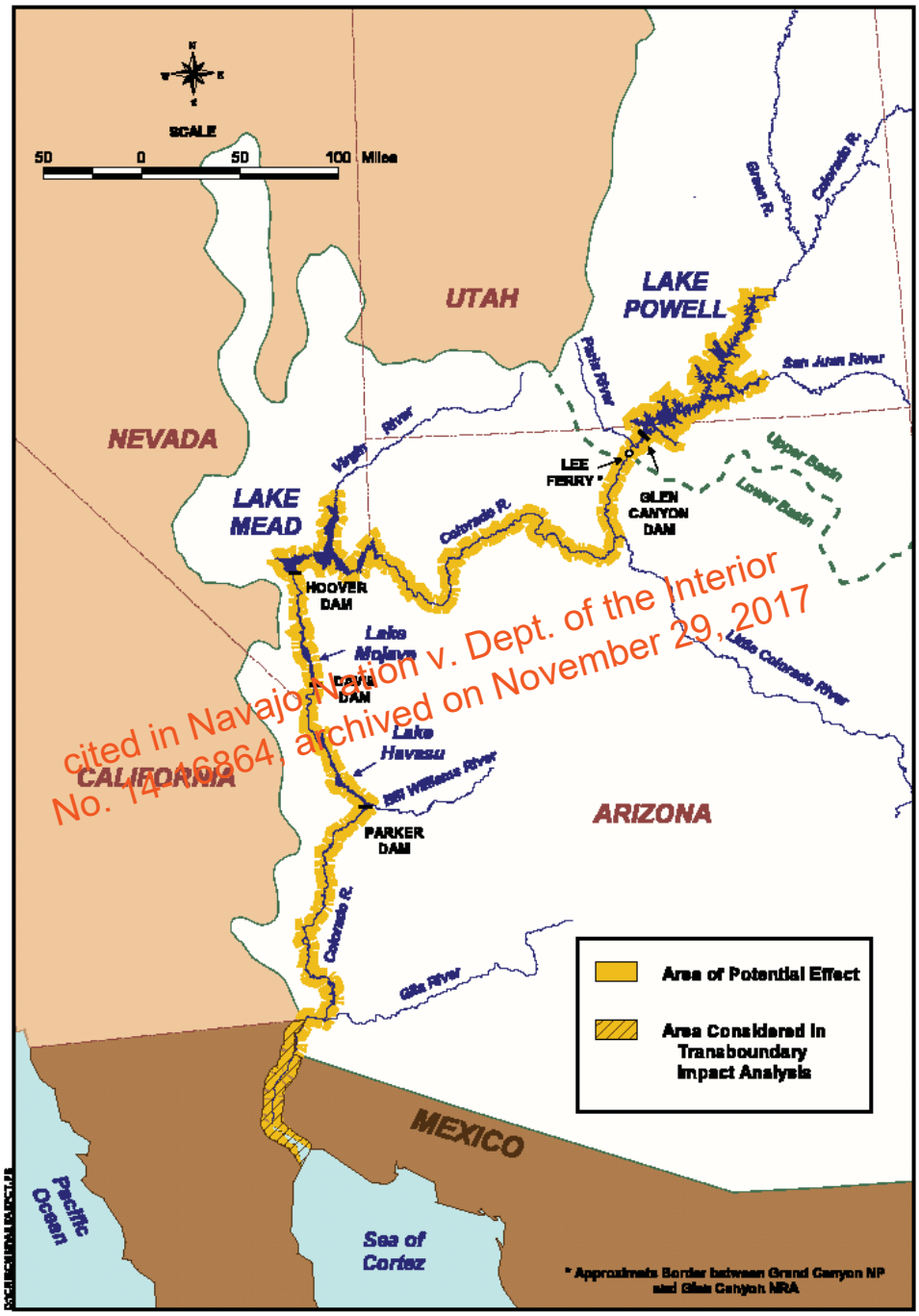
In addition to influencing conditions within the Colorado River system, it is recognized that continued delivery of surplus water that could result from interim surplus criteria would complement ongoing and proposed state actions in the Lower Basin. These actions could result in environmental effects outside of the river corridor. However, these actions have independent utility and are not caused by or dependent on interim surplus criteria for their implementation. Environmental compliance would be required on a case-by-case basis prior to their implementation. Therefore, Reclamation determined that the appropriate scope of this analysis is to consider only those potential effects that could occur within the Colorado River corridor as defined by the 100-year flood plain and reservoir maximum water surface elevations.

Interim surplus criteria are based on system conditions and hydrology. Water supply to the Lower Division states of Arizona, California and Nevada is achieved primarily through releases and pumping from Lake Mead. As a result of Lake Powell and Lake Mead equalization requirements (discussed further in Section 3.3), interim surplus criteria effects on Lake Mead surface elevations could also influence Lake Powell surface elevations and Glen Canyon Dam releases. However, operation of the other Upper Basin reservoirs is independent of Lake Powell. Therefore, the upstream limit of the potentially affected area under consideration in this FEIS is the full pool elevation of Lake Powell. The downstream limit of the potentially affected area within the United States is the SIB between the United States and Mexico. Section 3.16 of this FEIS addresses potential transboundary impacts in Mexico extending to the mouth of the Colorado River as required pursuant to Executive Order 12114 - Environmental Effects Abroad of Major Federal Actions, January 4, 1997, and the July 1, 1997 Council on Environmental Quality (CEQ) Guidelines on NEPA Analyses for Transboundary Impacts.

3.2.1 COLORADO RIVER SEGMENTS AND ISSUES ADDRESSED

As shown on Map 3.2-1, the Colorado River corridor from Lake Powell to Mexico consists of flowing river reaches, two large reservoirs (Lake Powell and Lake Mead) and two smaller reservoirs downstream of Lake Mead (Lake Mohave and Lake Havasu). The river corridor and adjacent areas comprise a heterogeneous composite of various geographic and hydrologic regimes, which differ in their resource composition and resource management administration.

Map 3.2-1
Area of Potential Effect



For the purposes of presentation, and to focus analysis of the potential effects of the interim surplus criteria, the river corridor has been divided into four areas: Lake Powell, the Colorado River between Glen Canyon Dam and Lake Mead, Lake Mead, and the Colorado River between Hoover Dam and the SIB. The following sections discuss the areas segmented for this analysis and introduce the issues considered within each area.

3.2.1.1 LAKE POWELL

Lake Powell is a large reservoir on the Colorado River formed by Glen Canyon Dam. The reservoir is narrow and long (over 100 miles). Lake Powell provides water storage for use in meeting delivery requirements to the Lower Basin.

The normal operating range of Lake Powell is between elevations 3490 and 3700 feet msl. Elevation 3490 feet msl corresponds to minimum power pool. (Releases from Glen Canyon Dam can be made below 3490 feet msl down to elevation 3370 feet msl via the river bypass tubes.) Elevation 3700 feet msl corresponds to the top of the spillway radial gates. During floods, the elevation of Lake Powell can go above 3700 feet msl by raising the radial spillway gates, resulting in spillway releases. In 1983, Lake Powell reached a high elevation of 3708.34 feet msl.

Lake Powell is located within the GCNRA, which is administered by the NPS. Reclamation retains authority and discretion for the operation of Glen Canyon Dam and Lake Powell. Issues considered in this FEIS associated with Lake Powell include: hydrology (i.e., projected reservoir surface elevations); salinity; aquatic resources; special-status species; recreational facilities, boating and sport fishing; power generation from Glen Canyon Dam; changes in pumping costs for Navajo Generating Station and the City of Page; visual and air quality effects associated with exposed reservoir shoreline; environmental justice; cultural resources; and Indian Trust Assets (ITAs).

3.2.1.2 COLORADO RIVER FROM GLEN CANYON DAM TO LAKE MEAD

The segment of the Colorado River between Glen Canyon Dam and Lake Mead is comprised of a narrow river corridor through the Grand Canyon that is administered primarily by the Grand Canyon National Park. Flows within this reach of the river consist primarily of releases from Glen Canyon Dam as discussed in Section 3.3.1. Issues considered in this FEIS within this segment of the river address those associated with a program of low steady summer flows and Beach/Habitat-Building Flow (BHBF) releases, as discussed in Section 3.2.2.

3.2.1.3 LAKE MEAD

Lake Mead is a large reservoir on the Colorado River formed by Hoover Dam. The reservoir provides water storage for use in regulating the water supply and meeting

delivery requirements in the Lower Basin. The normal operating range of the reservoir is between elevations 1219.61 and 1083 msl. Elevation 1083 msl corresponds to the minimum power pool. (Releases can be made from Hoover Dam below 1083 msl down to 895 feel msl via the intake towers.) During floods, the elevation of Lake Mead can go above 1219.61 msl. The top of the raised spillway gates is at 1221.0 msl. Since its initial filling in the late 1930s, the reservoir water level has fluctuated from a high of 1225.85 feet msl (as occurred in July, 1983) to a low of 1083.21 feet msl (as occurred in April, 1956).

The reservoir is located within the LMNRA, which is administered by the NPS. However, Reclamation retains authority and discretion for the operation of Hoover Dam and Lake Mead. Issues considered in this FEIS associated with Lake Mead include: hydrology; water supply for Nevada; salinity; water quality associated with Las Vegas Wash and SNWA intakes; aquatic resources; special-status species; recreational facilities, boating and sport fishing; power generation from Hoover Dam; visual and air quality effects associated with exposed reservoir shoreline; environmental justice; cultural resources; and ITAs.

3.2.1.4 COLORADO RIVER FROM HOOVER DAM TO THE SOUTHERLY INTERNATIONAL BOUNDARY

The Colorado River from Hoover Dam to the SIB is contained within the shallow Colorado River Valley in which Lake Mohave, Lake Havasu and other smaller diversion reservoirs are located. Within this segment, especially along river reaches below Parker Dam, the Colorado River is fringed with riparian vegetation and marshy backwaters, and contains a number of diversion dams and a system of levees. The northern reach of this segment, including Lake Mohave, lies within the LMNRA. The lower reach is bordered by a combination of federal, Tribal and private land. The last 22 miles (approximately) is along the international border with Mexico. Reclamation retains authority and discretion for river operations in the reaches of this segment.

Under the BCPA and the Decree, discussed previously in Chapter 1, releases from Hoover Dam are governed by orders for downstream water deliveries to Arizona, California, Nevada and Mexico. However, releases may exceed orders when flood releases are required under the Corps' flood control criteria, as discussed in Chapter 1 or for other purposes consistent with the BCPA and the Decree.

Issues considered in this FEIS associated with this river segment include hydrology; water supply for Arizona, California, Nevada and Mexico; costs of flood damages downstream of Hoover Dam; water quality; potential effects of changes in flows on special-status species; potential effects of changes in the temperature of water released from Hoover Dam on sport fisheries and fishing; environmental justice; cultural resources; and ITAs.

3.2.2 ADAPTIVE MANAGEMENT PROGRAM INFLUENCE ON GLEN CANYON DAM RELEASES

In March 1995, Reclamation completed an EIS on the operation of Glen Canyon Dam. The EIS developed and analyzed alternative operation scenarios designed to meet statutory responsibilities for conserving downstream resources, while meeting other authorized project purposes, and protecting Native American interests. Major issues of concern included native and endangered species, beach erosion, recreation (including white-water boating, sport fishing, and camping), vegetation, wildlife habitat and food base, water supply, hydroelectric power generation, cultural resources, and Native American interests. The Secretary signed a ROD on October 8, 1996, which specified certain types of releases from Glen Canyon Dam. Prior to the ROD, Glen Canyon Dam was operated as a peaking power facility, maximizing the value of power produced. The patterns of releases resulting from this type of operation were recognized to be detrimental to downstream resources and were therefore modified by the ROD. Reclamation also consulted with the Service under the ESA. The Service issued a biological opinion containing a recommendation for a reasonable and prudent alternative, which was incorporated into the ROD (see Section 1.4.2.1).

To determine if the operation of Glen Canyon Dam under the ROD is meeting the objectives of downstream resource protection, an AMP was instituted as described in Section 1.4.2.1. Through this process, the effects of dam operations and the status of resources are monitored and studied. The results are used to formulate potential recommendations to the Secretary on refinements to dam operations to ensure that the purposes of the Grand Canyon Protection Act are met. As long as the AMP continues to successfully function, the natural and cultural resources within the Colorado River corridor between Glen Canyon Dam and Separation Canyon (just upstream of Lake Mead) will be protected and conserved.

Two types of releases from Glen Canyon Dam, BHBFs and low steady summer flows, are part of a program of experimental flows being developed and refined through the AMP, as called for in the Biological Opinion (USFWS, 1994). The change in the frequency with which BHBFs and low steady summer flows would be triggered under each of the alternatives has been analyzed (see Section 3.6). Flows from Glen Canyon Dam, which could be affected by the adoption of interim surplus criteria, will remain within the range of flows analyzed in detail in the Glen Canyon Dam EIS. Therefore, effects of potential changes in the frequencies of these flows on downstream resources require no further analysis outside of the Glen Canyon Dam ROD and the AMP.

3.3 RIVER SYSTEM OPERATIONS

This section addresses the operation of the Colorado River system, the modeling process used to simulate river operation and potential changes that may occur from implementation of the interim surplus criteria. The term *system management* refers to how the water is managed once it enters the Colorado River system and includes operation of the system reservoirs, dams and other Colorado River system facilities. The environmental and socioeconomic effects of the interim surplus criteria alternatives stem from changes in the operation of the Colorado River system under the surplus alternatives relative to the baseline conditions.

3.3.1 OPERATION OF THE COLORADO RIVER SYSTEM

Operation of the Colorado River system and delivery of Colorado River water to the seven Basin States and Mexico are conducted in accordance with the *Law of the River* as discussed in Section 1.3.2.1. Water cannot be released from storage unless there is a reasonable beneficial use for the water. The exceptions to this are releases required for flood control, river regulation or dam safety. In the Lower Basin, water is released from the system to satisfy water delivery orders and to satisfy other purposes set forth in the Decree. The principal facilities that were built to manage the water in the Colorado River System include Glen Canyon Dam and Hoover Dam.

The Colorado River system is operated by Reclamation pursuant to LROC and the AOP. The AOP is required by the CRBPA. The AOP is formulated for the upcoming year under a variety of potential scenarios or conditions. The plan is developed based on projected demands, existing storage conditions and probable inflows. The AOP is prepared by Reclamation, acting on behalf of the Secretary, in consultation with the Basin States, the Upper Colorado River Commission, Indian tribes, appropriate federal agencies, representatives of the academic and scientific communities, environmental organizations, the recreation industry, water delivery contractors, contractors for the purpose of federal power, others interested in Colorado River operations, and the general public.

Prior to the beginning of the calendar year, Lower Basin diversion schedules are requested from water users entitled to Colorado River water as discussed in Section 3.4. These schedules are estimated monthly diversions and return flows that allow Reclamation to determine a tentative schedule of monthly releases through the Hoover Powerplant. Actual monthly releases are determined by the demand for water downstream of Hoover Dam. Daily changes in water orders are made to accommodate emergencies, temperature and weather.

A minimum of 1.5 maf is delivered annually to Mexico in accordance with the Treaty. The Treaty contains provisions for delivery of up to 200,000 af above the 1.5 maf when there exists water in excess of that necessary to satisfy the uses in the United States and the guaranteed quantity of 1.5 maf to Mexico. Additionally, excess flows above the

200,000 af may become available to Mexico coincident with Lake Mead flood control releases and Gila River flood flows provided that the reasonable beneficial uses of the Lower Division states have been satisfied.

3.3.1.1 OPERATION OF GLEN CANYON DAM

Flows below Glen Canyon Dam are influenced by storage and release decisions that are scheduled and implemented on an annual, monthly and hourly basis from Glen Canyon Dam.

The annual volume of water released from Glen Canyon Dam is made according to the provisions of the LROC that includes a minimum objective release of 8.23 maf, storage equalization between Lake Powell and Lake Mead under prescribed conditions and the avoidance of spills. Annual releases from Lake Powell greater than the minimum occur if Upper Basin storage is greater than the storage required by Section 602(a) of the CRBPA, and if the storage in Lake Powell is greater than the storage in Lake Mead. Annual release volumes greater than the minimum objective of 8.23 maf are also made to avoid anticipated spills.

Monthly operational decisions are generally intermediate targets needed to systematically achieve the annual operating requirements. The actual volume of water released from Lake Powell each month depends on the forecasted inflow, storage targets and annual release requirements described above. Demand for energy is also considered and accommodated as long as the annual release and storage requirements are not affected.

The National Weather Service Colorado Basin River Forecast Center (CBRFC) provides the monthly forecasts of expected inflow into Lake Powell. The CBRFC uses a satellite-telemetered network of hundreds of data collection points within the Upper Colorado River Basin that gather data on snow water content, precipitation, temperature and streamflow. Regression and real-time conceptual computer models are used to forecast inflows that are then used by Reclamation to plan future release volumes. Due to the variability in climatic conditions, modeling and data errors, these forecasts are based, in part, on large uncertainties. The greatest period of uncertainty occurs in early winter and decreases as the snow accumulation period progresses into the snowmelt season, often forcing modifications to the monthly schedule of releases.

An objective in the operation of Glen Canyon Dam is to attempt to safely fill Lake Powell each summer. When carryover storage from the previous year in combination with forecasted inflow allows, Lake Powell is targeted to reach a storage of about 23.8 maf in July (0.5 maf from full pool). In years when Lake Powell fills or nearly fills in the summer, releases in the late summer and early winter are generally made to draw the reservoir level down, so that there is at least 2.4 maf of vacant space in Lake Powell on January 1. Storage targets are always reached in a manner consistent with the LROC.

Scheduling of BHBF releases from Glen Canyon Dam are discussed in Section 3.6.2.2.

Daily and hourly releases are made according to the parameters of the ROD for the Operation of Glen Canyon Dam Final Environmental Impact Statement and published in the *Glen Canyon Dam Operating Criteria* (62 CFR 9447, Mar. 3, 1997), as shown in Table 3.3-1.

Table 3.3-1
Glen Canyon Dam Release Restrictions

Parameter	Cubic Feet per Second	Conditions
Maximum Flow[1]	25,000	
Minimum Flow	5,000	Nighttime
	8,000	7:00 a.m. to 7:00 p.m.
Ramp Rates		
Ascending	4,000	Per hour
Descending	1,500	Per hour
Daily Fluctuations[2]	5,000 to 8,000	

[1] To be evaluated and potentially increased as necessary and in years when delivery to the Lower Basin exceeds 8.23 maf.
[2] Daily fluctuation limit is 5,000 cfs for months with release volumes less than 0.6 maf; 6,000 cfs for monthly release volumes of 0.6 maf to 0.8 maf; and 8,000 cfs for monthly volumes over 0.8 maf.

3.3.1.2 Operation of Hoover Dam

Hoover Dam is managed to provide at least 7.5 maf annually for consumptive use by the Lower Division states plus the United States' obligation to Mexico. Hoover Dam releases are managed on an hourly basis to maximize the value of generated power by providing peaking during high-demand periods. This results in fluctuating flows below Hoover Dam that can range from 1,000 cubic feet per second (cfs) to 49,000 cfs. The upper value is the maximum flow-through capacity through the powerplant at Hoover Dam (49,000 cfs). However, because these flows enter Lake Mohave downstream, the affected zone of fluctuation is only a few miles.

Releases of water from Hoover Dam may also be affected by the Secretary's determinations relating to normal, surplus or shortage water supply conditions, as discussed in Section 1.3.4.1. Another type of release includes flood control releases. For Hoover Dam, flood control releases are defined in this FEIS as releases in excess of the downstream demands.

Flood control was specified as a primary project purpose by the BCPA, the act authorizing Hoover Dam. The Corps is responsible for developing the flood control operation plan for Hoover Dam and Lake Mead as indicated in 33 CFR 208.11. The plan is the result of a coordinated effort by the Corps and Reclamation. However, the Corps is responsible for providing the flood control regulations and has authority for

final approval of the plan. Any deviations from the flood control operating instructions provided by the plan must be authorized by the Corps. The Secretary is responsible for operating Hoover Dam in accordance with these regulations.

Lake Mead's uppermost 1.5 maf of storage capacity, between elevations 1219.61 and 1229.0, is defined as exclusive flood control space. Within this capacity allocation, 1.218 maf of flood storage is above elevation 1221.0, which is the top of the raised spillway gates.

Flood control regulations specify that once Lake Mead flood releases exceed 40,000 cfs, the releases shall be maintained at the highest rate until the reservoir drops to elevation 1221.0 feet msl. Releases may then be gradually reduced to 40,000 cfs until the prescribed seasonal storage space is available.

The regulations set forth two primary criteria for flood control operations related to snowmelt: 1) preparatory reservoir space requirements, and 2) application of runoff forecasts to determine releases.

In preparation for each annual season of snow accumulation and associated runoff, progressive expansion of total Colorado River system reservoir space is required during the latter half of each year. Minimum available flood control space increases from 1.5 maf on August 1 to 5.35 maf on January 1. Required flood storage space can be accumulated within Lake Mead and in specified upstream reservoirs: Powell, Navajo, Blue Mesa, Flaming Gorge and Fontenelle. The minimum required to be reserved exclusively for flood control storage in Lake Mead is 1.5 maf. Table 3.3-2 presents the amount of required flood storage space within the Colorado River system by date:

Table 3.3-2
Minimum Required Colorado River System Storage Space

Date	Storage Volume (maf)
August 1	1.50
September 1	2.27
October 1	3.04
November 1	3.81
December 1	4.58
January 1	5.35

Normal space-building releases from Lake Mead to meet the required August 1 to January 1 flood control space are limited to a maximum of 28,000 cfs. Releases in any month based on water entitlement holders' demand are much less than 28,000 cfs (on the order of 20,000 cfs or less).

Between January 1 and July 31, flood control releases, based on forecasted inflow, may be required to prevent filling of Lake Mead beyond its 1.5 maf minimum space requirement. Beginning on January 1 and continuing through July, the CBRFC issues monthly runoff forecasts. These forecasts are used by Reclamation in estimating releases from Hoover Dam. The release schedule contained in the Corps' regulations is based on increasing releases in six steps as shown on Table 3.3-3.

Table 3.3-3
Minimum Flood Control Releases at Hoover Dam

Step	Amount of Cubic Feet/Second
Step 1	0
Step 2	19,000
Step 3	28,000
Step 4	35,000
Step 5	40,000
Step 6	73,000

The lowest step, zero cfs, corresponds to times when the regulations do not require flood control releases. Hoover Dam releases are then made to meet water and power objectives. The second step, 19,000 cfs, is based on the powerplant capacity of Parker Dam. The third step, 28,000 cfs, corresponds to the Davis Dam Powerplant capacity. The fourth step in the Corps release schedule is 35,000 cfs. This flow corresponds to the powerplant flow-through capacity of Hoover Dam in 1987. However, the present powerplant flow-through capacity at Hoover Dam is 49,000 cfs. At the time Hoover Dam was completed, 40,000 cfs was the approximate maximum flow from the dam considered to be nondamaging to the downstream streambed. The 40,000 cfs flow now forms the fifth step. Releases of 40,000 cfs and greater would result from low-probability hydrologic events. The sixth and final step in the series (73,000 cfs) is the maximum controlled release from Hoover Dam that can occur without spillway flow.

Flood control releases are required when forecasted inflow exceeds downstream demands, available storage space at lakes Mead and Powell and allowable space in other Upper Basin reservoirs. This includes accounting for projected bank storage and evaporation losses at both lakes, plus net withdrawal from Lake Mead by the SNWA. The Corps regulations set the procedures for releasing the volume that cannot be impounded, as discussed above.

Average monthly releases are determined early in each month and apply only to the current month. The releases are progressively revised in response to updated runoff forecasts and changing reservoir storage levels during each subsequent month throughout the January 1–July 31 runoff period. If the reservoirs are full, drawdown is accomplished to vacate flood control space as required. Unless flood control is necessary, Hoover Dam is operated to meet downstream demands.

During non-flood operations, the end-of-month Lake Mead elevations are driven by consumptive use needs, Glen Canyon Dam releases and Treaty deliveries to Mexico. Lake Mead end-of-month target elevations are not fixed as are the end-of-month target elevations for Lake Mohave and Lake Havasu. Normally, Lake Mead elevations decline with increasing irrigation deliveries through June or later and then begin to rise again. Lake Mead's storage capacity provides for the majority of Colorado River regulation from Glen Canyon Dam to the border with Mexico.

3.3.2 NATURAL RUNOFF AND STORAGE OF WATER

Most of the natural flow in the Colorado River system originates in the Upper Basin and is highly variable from year to year. The natural flow represents an estimate of runoff flows that would exist without storage or depletion by man and was used in the modeling of the baseline conditions and interim surplus criteria alternatives. About 86 percent of the Colorado River System annual runoff originates in only 15 percent of the watershed—in the mountains of Colorado, Utah, Wyoming and New Mexico. While the average annual natural flow at Lees Ferry is calculated at 15.1 maf, annual flows in excess of 23 maf and as little as 5 maf have occurred. The flow in the Colorado River above Lake Powell reaches its annual maximum during the April through July period. During the summer and fall, thunderstorms occasionally produce additional peaks in the river. However, these flows are usually smaller in volume than the snowmelt peaks and of much shorter duration. Flows immediately below Glen Canyon Dam consist almost entirely of water released from Lake Powell. Downstream of Glen Canyon Dam, the annual river gains from tributaries, groundwater discharge and occasional flash floods from side canyons average 900,000 af. Immediately downstream of Hoover Dam, the river flows consist almost entirely of water released from Lake Mead. Downstream of Hoover Dam, the river gains additional water from tributaries such as the Bill Williams River and the Gila River, groundwater discharge, and return flows.

Total storage capacity in the Colorado River system is nearly four times the river's average natural flow. The various reservoirs that provide storage in the Colorado River system and their respective capacities were discussed in Section 1.3.2.

Figure 3.3-1 presents an overview of the historical natural flow calculated at Lees Ferry for calendar years 1906 through 1999. The natural flow represents an estimate of the flows that would originate or exist above Lees Ferry without storage or depletion by man. This is different than the recorded or historical stream flows that represent actual measured flows. Figure 3.3-2 presents an overview of the historical flows recorded at Lees Ferry for the period 1922 through 1999 (calendar year).

Figure 3.3-1
Natural Flow at Lees Ferry Stream Gage

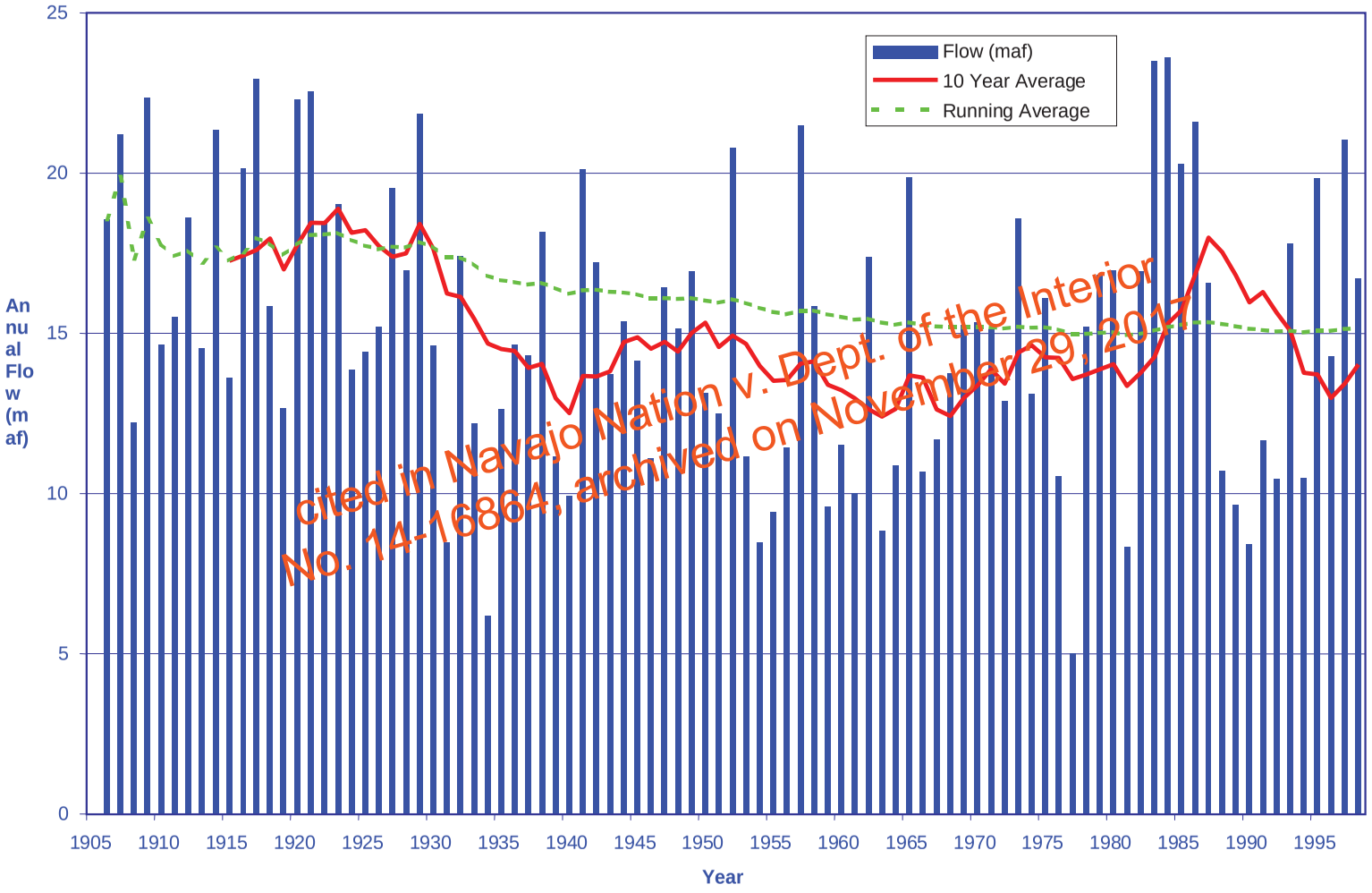
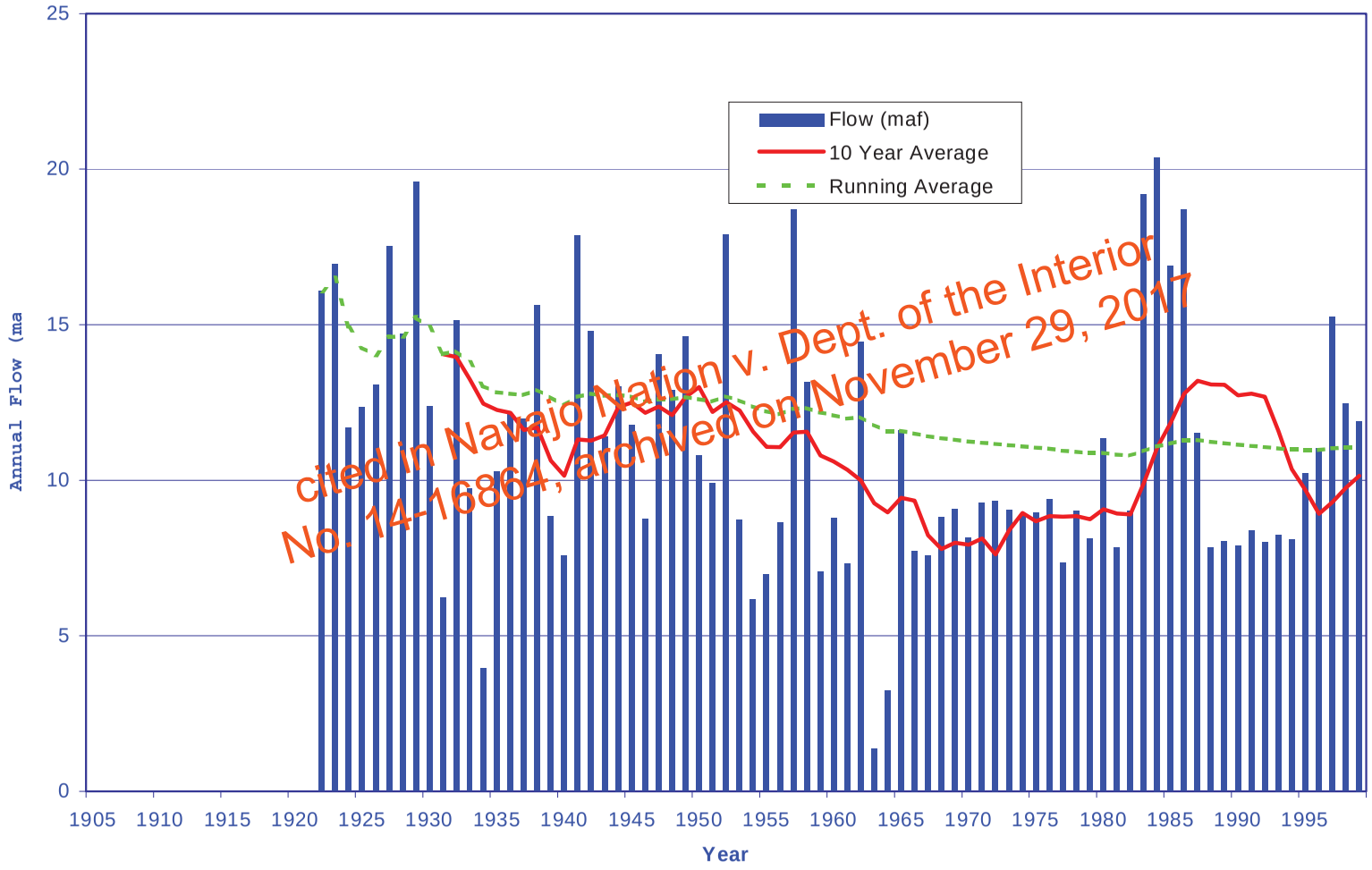


Figure 3.3-2
Historic Annual Flow at Lees Ferry Stream Gage



3.3.3 MODELING AND FUTURE HYDROLOGY

3.3.3.1 MODEL CONFIGURATION

Future Colorado River system conditions under baseline conditions and the surplus alternatives were simulated using a computerized model. The model framework used for this process is a commercial river modeling software called RiverWare. RiverWare was developed by the University of Colorado through a cooperative process with Reclamation and the Tennessee Valley Authority. RiverWare was configured to simulate the Colorado River System and its operation and integrates the Colorado River Simulation System (CRSS) model that was developed by Reclamation in the early 1970s. River operation parameters modeled and analyzed include the water entering the river system, storage in system reservoirs, releases from storage, river flows, and the water demands of and deliveries to the Basin States and Mexico.

The water supply used by the model consists of the historic record of natural flow in the river system over the 85-year period from 1906 through 1990, from 29 individual inflow points on the system.

Future Colorado River water demands were based on demand and depletion projections prepared by the Basin States. Depletions are defined as diversions from the river less return flow credits, where applicable. Return flow credits are applied when a portion of the diverted water is returned to the river system. In cases where there are no return flow credits associated with the diversions, the depletion is equal to the diversion. The simulated operation of Glen Canyon Dam, Hoover Dam and other elements of the Colorado River system was consistent with the LROC, applicable requirements for storage and flood control management, water supply deliveries to the Basin States, Indian tribes, and Mexico, and flow regulation downstream of the system dams.

3.3.3.2 INTERIM SURPLUS CRITERIA MODELED

As discussed in Chapter 2, seven operational scenarios are considered in this FEIS. The seven scenarios considered and modeled consist of two different baseline conditions and the five surplus alternatives. The two baseline conditions are similar except that one includes the modeling of California's intrastate water transfers while the other does not. The five surplus alternatives consist of the Basin States, Flood Control, Six States, California and the Shortage Protection alternatives.

Surplus deliveries to the Lower Division states and Mexico are provided under baseline conditions and all surplus alternatives. Common to baseline conditions and all alternatives, a surplus is determined when flood control releases are made from Lake Mead. As a general modeling assumption, Mexico receives surplus deliveries only under this condition.

As noted above, two different baseline conditions were modeled and evaluated (baseline conditions with transfers and baseline conditions without transfers). The normal schedules of the three California entities involved in the transfers (Metropolitan Water District, Imperial Irrigation District, and Coachella Water Valley District) are tabulated in Attachment H. The comparative analysis of the two baseline conditions is presented in Attachment L. The baseline conditions with transfers were selected for use in the comparative analysis of the surplus alternatives. The reason for this is a desire to maintain consistency. All of the surplus alternatives include intrastate water transfers and therefore, it was prudent to compare the baseline conditions with transfers to focus and isolate the potential impacts of the interim surplus criteria from that of transfers.

3.3.3.3 GENERAL MODELING ASSUMPTIONS

Definitions and descriptions of the baseline conditions and the surplus alternatives and their operational criteria were provided in Chapter 2. The modeling of river system operations for the analysis presented in this FEIS also required certain assumptions about various aspects of water delivery and system operation. Some important modeling assumptions are listed below. Other modeling details and assumptions are presented in Attachment J.

Assumptions Common to Baseline and All Alternatives:

- The current Upper Basin reservoir operating rules are equivalent under all surplus alternatives and the baseline conditions.
- The Lake Mead flood control procedures are always in effect.
- Reservoir starting conditions (all system reservoirs) are based on projected water level elevations for January 1, 2002. Reclamation's 24 month study model (also a model implemented in RiverWare) was used to project these elevations, using actual elevations as of August 2000 and projected operations for the 2001 water year.
- The Upper Basin States' depletion projections are as provided by the Upper Colorado River Commission (December 1999) and subsequently modified to include new Indian tribe schedules provided during the preparation of the DEIS. (See Attachments K and Q.)
- Water deliveries to Mexico are pursuant to the requirements of the Treaty. This provides minimum annual deliveries of 1.5 maf to Mexico and up to 1.7 maf under Lake Mead flood control release conditions.
- Mexico's principal diversion is at Morelos Dam where most of its Colorado River apportionment of 1.5 maf is diverted. In practice, up to 140 thousand acre-feet (kaf) is delivered to Mexico near the Southerly International Boundary (SIB). The model, however, extends to just south of the Northerly International Boundary (NIB) to include the diversion at Morelos Dam and accounts for the

entire Treaty delivery at that point. Under normal conditions, the model sets the diversion and depletion schedule for the Mexican Treaty delivery at Morelos Dam to 1.515 mafy. The additional 15,000 af accounts for typical scheduling errors and over-deliveries.

- The modeled Colorado River water deliveries under the baseline conditions and surplus alternatives assumed that all Arizona shortages would be absorbed by the Central Arizona Project. Reclamation acknowledges that under the current priority framework, there would be some sharing of Arizona shortage between the Central Arizona Project and other Priority 4 users. However, the bases or formula for the sharing of Arizona shortages is the subject of current negotiations and as such, could not be adequately modeled for the FEIS. The water supply conditions modeled for the FEIS were used to evaluate the relative differences in water deliveries to each state under baseline conditions and the surplus alternatives. The normal, surplus and shortage condition water depletion schedules modeled in the FEIS are consistent with the depletion schedules prepared by the Basin states for this purpose.
- For the modeling presented in the FEIS, the Yuma Desalting Plant depletion schedule for bypass to Mexico was set to 120,000 acre-feet per year (afy) from 2002-2021, representing the water provided by the U.S. to the Cienega. For modeling purposes, this depletion is not counted as part of the Treaty delivery. The desalting plant is assumed to operate beginning 2022, reducing the bypass to 52,000 afy. Similarly, for modeling purposes, this depletion is not counted as part of the Treaty delivery. It should be noted that the United States recognizes that it has an obligation to replace, as appropriate, the bypass flows and the assumptions made herein, for modeling purposes, do not necessarily represent the policy that Reclamation will adopt for replacement of bypass flows. The assumptions made with respect to modeling the bypass flows are intended only to provide a thorough and comprehensive accounting of Lower Basin water supply. The United States is exploring options for replacement of the bypass flows, including options that would not require operation of the Yuma Desalting Plant.
- Lake Mead is operated to meet depletion schedules provided by the Lower Division states, Indian tribes, and Mexico. (See Attachments H and Q.)
- Lake Mohave and Lake Havasu are operated in accordance with their existing rule curves.
- The water supply conditions modeled under the surplus alternatives and baseline conditions considered the intrastate water transfers being planned by California.
- There are no established shortage criteria that define when Lower Basin water users would receive shortage condition deliveries. However, the model is configured to provide approximately an 80 percent protection for Lake Mead water elevation of 1083 feet msl (minimum power generation elevation).

Assumptions Specific to Surplus Alternatives:

- The respective surplus criteria for the surplus alternatives are assumed to be effective for a specified period of 15 years. The effective period that was modeled is defined as the 15-year period beginning on January 1, 2002 and ending December 31, 2016. At the conclusion of the 15-year period, the modeled operating criteria for each of the surplus alternatives is assumed to revert to the operating criteria used to model baseline conditions (baseline conditions with transfers).
- The surplus depletion schedules for Arizona, California and Nevada vary under each surplus alternative and the baseline conditions and are presented in Attachment H.

3.3.3.4 Lake Mead Water Level Protection Assumptions

There are no established shortage criteria for the operation of Lake Mead. However, it was necessary to include some shortage criteria in the model simulation to address concerns related to low Lake Mead water levels. Three important Lake Mead water elevations were selected for analysis. The significance of these selected elevations relates to known economic and/or socioeconomic impacts that would occur if Lake Mead water levels were lowered below the selected water levels. Elevation 1083 feet msl is the minimum water level for effective power generation at the Hoover Powerplant based on its existing turbine configuration. Elevation 1050 feet msl is the minimum water level necessary for operation of SNWA's upper water intake. Water withdrawn from the Lake Mead through this intake is delivered to Las Vegas Valley, Boulder City and other parts of Clark County. Even though SNWA has constructed a second intake at a lower elevation, the original intake at elevation 1050 feet msl is needed to meet full SNWA summer diversions. Elevation 1000 feet msl is the minimum water level necessary for operation of SNWA's lower water intake.

In the absence of specific shortage criteria, the Lake Mead level protection assumptions listed below were applied by the model to facilitate the evaluation of the baseline conditions and surplus alternatives.

First Level Shortage:

- The Lake Mead water level of 1083 feet msl was designated as a level that should be protected. Operation simulations were performed to develop a "protection line" to prevent the water level from declining below elevation 1083 feet msl with approximately an 80 percent probability (see Section 3.3.4.1). The use of an alternative 1050-foot protection line is discussed in Attachment M.
- A shortage would be determined to exist when the Lake Mead water level dropped below the protection line for elevation 1083 feet msl.

- During first level shortage conditions, the annual water delivery to CAP was set to 1.0 maf, and the SNWA was assigned four percent of the total shortage.

Second Level Shortage:

- A second level shortage would be determined to exist when the Lake Mead water surface elevation declined to 1000 feet msl.
- During second level shortage conditions, the CAP and SNWA consumptive use would be reduced as needed to maintain the Lake Mead water level at 1000 feet msl. Once the delivery to the CAP is reduced to zero, deliveries to MWD and to Mexico would be reduced to maintain the Lake Mead water level at 1000 feet msl. Such reductions to MWD and Mexico did not occur in the simulations conducted as part of this FEIS.

3.3.3.5 COMPUTATIONAL PROCEDURES

The model was used to simulate the future state of the Colorado River system on a monthly basis, in terms of reservoir levels, releases from the dams, hydroelectric energy generation, flows at various points along the system and diversions to and return flows from various water users. The input data for the model included the monthly tributary inflows, various physical process parameters (such as the evaporation rates for each reservoir) and the diversion and depletion schedules for entities in the Basin States and Mexico. The common and specific operating criteria were also input for each alternative being studied.

Despite the differences in the operating criteria for the baseline conditions and each surplus alternative, the future state of the Colorado River system (i.e., water levels at Lake Mead and Lake Powell) is most sensitive to the future inflows. As discussed in Section 3.3.2, observations over the period of historical record (1906–present) show that inflow into the system has been highly variable from year to year. Predictions of the future inflows, particularly for long-range studies, are highly uncertain. Although the model does not predict future inflows, it can be used to analyze a range of possible future inflows and to quantify the probability of particular events (i.e., lake levels being below or above certain levels).

Several methods are available for ascertaining the range of possible future inflows. On the Colorado River, a particular technique (called the Indexed Sequential Method) has been used since the early 1980s and involves a series of simulations, each applying a different future inflow scenario (USBR, 1985; Ouarda, *et al.*, 1997). Each future inflow scenario is generated from the historical natural flow record by "cycling" through that record. For example, the first simulation assumes that the inflows for 2002 through 2050 will be the 1906 through 1954 record, the second simulation assumes the inflows for 2002 through 2050 will be the 1907 through 1955 record, and so on. As the method progresses, the historical record is assumed to "wrap-around" (i.e., after 1990, the record reverts back to 1906), yielding a possible 85 different inflow scenarios. The

result of the Indexed Sequential Method is a set of 85 separate simulations (referred to as "traces") for each operating criterion that is analyzed. This enables an evaluation of the respective criteria over a broad range of possible future hydrologic conditions using standard statistical techniques, discussed in Section 3.3.3.6.

3.3.3.6 POST-PROCESSING AND DATA INTERPRETATION PROCEDURES

The various environmental and socioeconomic analyses in this FEIS required the sorting and arranging of various types of model output data into tabulations or plots of specific operational conditions, or parameters, at various points on the system. This was done through the use of statistical methods and other numerical analyses.

The model generates data on a monthly time step for some 300 points (or nodes) on the river system. Furthermore, through the use of the Indexed Sequential Method, the model generates 85 possible outcomes for each node for each month over the time period 2002 through 2050. These very large data sets are generated for each surplus alternative and baseline conditions and can be visualized as three-dimensional data "cubes" with the axes of time, space (or node) and trace (or outcome for each future hydrology). The data are typically aggregated to reduce the volume of data and to facilitate comparing the alternatives to baseline conditions and to each other. The type of aggregation varies depending upon the needs of the particular resource analysis. The post-processing techniques used for this FEIS fall into two basic categories: those that aggregate in time, space or both, and those that aggregate the 85 possible outcomes.

For aggregation in time and space, simple techniques are employed. For example, deliveries of Colorado River water to all California diversion nodes in the model are summed to produce the total delivery to the state for each calendar year. Similarly, lake elevations may be chosen on an annual basis (i.e., end of December) to show long-term lake level trends as opposed to short-term fluctuations. Since the interim criteria period is 2002 through 2016, some analyses may suggest aggregating over that period of time and comparing the aggregation over the remaining years (2017 through 2050). The particular aggregation used will be noted in the methodology section for each resource.

Once the appropriate temporal and spatial aggregation is chosen, standard statistical techniques are used to analyze the 85 possible outcomes for a fixed time. Statistics that may be generated include the mean and standard deviation. However, the most common technique simply ranks the outcomes at each time (from highest to lowest) and uses the ranked outcomes to compute other statistics of interest. For example, if end-of-calendar year Lake Mead elevations are ranked for each year, the median outcome for a given year is the elevation for which half of the values are below and half are above (the median value or the 50^{th} percentile value). Similarly, the elevation for which 10 percent of the values are less than or equal to, is the 10^{th} percentile outcome.

Several presentations of the ranked data are then possible. A graph (or table) may be produced that compares the 90^{th} percentile, 50^{th} percentile, and 10^{th} percentile outcomes

from 2002 through 2050 for the baseline and all alternatives. It should be noted that a statistic such as the 10th percentile is not the result of any one hydrologic trace (i.e., no historical sequence produced the 10th percentile).

3.3.4 MODELING RESULTS

This section presents general and specific discussions of the Colorado River System operation modeling results. The following sequence of topics is used to address the potentially affected river system components:

- Lake Powell water levels,
- River flows between Glen Canyon Dam and Lake Mead,
- Lake Mead water levels, and
- River flows below Hoover Dam.

As noted previously, the potentially affected portion of the Colorado River system extends from Lake Powell to the SIB. Although lakes Mohave and Havasu are within the potentially affected area, it has been determined that the interim surplus criteria would have no effect on the operation of these facilities. The operation of lakes Mohave and Havasu is pursuant to monthly operating target elevations that are used to manage the storage and release of water and power production at these facilities. Under the respective target elevations, the water level fluctuation is approximately 14 feet for Lake Mohave and approximately four feet for Lake Havasu. Under all future operating scenarios considered under this FEIS, lakes Mohave and Havasu would continue to be operated under the current respective monthly target elevations.

3.3.4.1 GENERAL OBSERVATIONS CONCERNING MODELING RESULTS

Some changes to the modeling assumptions were anticipated in the DEIS and were made for the FEIS as noted in Section 3.3.3.3. These changes included the following:

- updating the initial conditions to reflect the current state of the system;
- updating the depletion schedules for all of the Basin States, including the Indian tribes;
- changing the baseline operation from 75R to 70R (as described in Section 2.2.5); and
- updating the shortage protection triggers to incorporate the new Upper Basin depletion schedules.

The general effects of these changes are described below:

- For the DEIS, the simulation model was run from 2000 through 2050, using the historical reservoir contents as of January 1, 2000, for the initial

conditions. For the FEIS, the model was run from 2002 through 2050, using forecasted reservoir contents for January 1, 2002. The forecast was obtained from Reclamation's operations model (the "24-month Study Model"), run in September, 2000. Due to the relatively low inflow observed for the 2000 water year (approximately 75 percent of normal or about 11.4 maf of natural inflow to Lake Powell), the total initial system storage decreased approximately 4.129 maf. This amounted to decreases in initial elevations of 3.5 feet and 26.0 feet at lakes Powell and Mead, respectively. The change in initial conditions affects the results of the first few years of the simulations, and then is negligible (after about 2005).

- Upper Division depletion schedules were updated to those submitted by the Upper Colorado River Commission (December, 1999), and subsequently modified to include updated Indian tribes schedules as provided by the Ten Tribes Partnership. The updated depletion schedules for the Indian Tribes and the Upper Division totals are detailed in Attachments "Q" and "K". The total increase in Upper Division scheduled depletions ranged from two to eight percent in any given year, with an average over all years of about five percent. The largest increases are in the early years (eight percent increases in years 2005 through 2010; 6.6 percent in 2016). In general, lakes Powell and Mead show a more rapid decline (observed in the 50th percentile under baseline conditions) due to the increased demand in the early years. Recovery of Lake Powell after the interim period is also more rapid as the increased depletions tend to turn off equalization earlier due to the 602(a) storage provision. The long-term effect of these depletions is that lakes Mead and Powell stabilize at 2050 about 12.5 and 5.5 feet, respectively, below the levels shown in the DEIS.

- Lower Division normal depletion schedules were updated to incorporate the new Indian tribe demands and remain at each states' apportionment. Surplus depletion schedules were also updated for each alternative as provided by the entities involved and is detailed in Attachment H. The California alternative tends to be more liberal in the FEIS compared to the DEIS with regard to surplus deliveries and is now closer to the results of the Shortage Protection Alternative.

- As discussed in Section 2.2.5, the baseline surplus strategy was changed from 75R to 70R, which changes the inflow assumption used when computing the system space available. As discussed in the DEIS, the change has a negligible effect upon the baseline results.

- The shortage protection triggers were re-computed to account for the new Upper Basin depletion schedules and to investigate the issues of protecting a specified lake level with a specified degree of assurance. To ensure statistical independence, stochastically generated natural inflows above Powell were used in the study. The study used the CRSSez model and the procedure is

documented in the CRSSez User's Manual (USBR, May 1988). The new triggers resulted in approximately 73 percent assurance of protecting Lake Mead elevation 1083 through the year 2040, although after 2040, the assurance level tails off rapidly (to less than 60 percent in 2050). The validity of the comparisons between surplus alternatives, however, is not compromised since all of the modeled conditions use the same shortage protection assumptions.

The following general observations apply to the overall modeling and analyses results:

- Future water levels of Lakes Powell and Mead will probably be lower than historical levels due to increasing Upper Basin depletions under the baseline conditions and the surplus alternatives. Of the five surplus alternatives, the Flood Control Alternative and baseline conditions were shown to have the least tendency to reduce reservoir water levels. The Shortage Protection and California alternatives were shown to have the highest tendency to reduce reservoir water levels. The results of the Six States and Basin States alternatives are similar and fall between those of the baseline conditions and the Shortage Protection and California alternatives.

- Median Lake Mead elevations decline throughout the period of analysis for the baseline conditions and the surplus alternatives because Lower Division depletions exceed long-term inflow. Median Lake Powell elevations decline for a number of years and then stabilize for the baseline conditions as well as all surplus alternatives. The declining trend in Lake Powell elevations for the baseline conditions and all surplus alternatives is due to increasing Upper Division depletions. For the Six State, Basin States, California, and Shortage Protection alternatives, the decline is more pronounced due to Lower Basin surplus deliveries and associated equalization releases from Lake Powell. Lake Powell elevations eventually stabilize under the baseline conditions and all alternatives. This behavior is caused by less frequent equalization releases from Lake Powell (due to the 602(a) storage requirement) as the Upper Division states continue to increase their use of Colorado River water.

- A comparative analysis of the baseline conditions with and without California intrastate transfers was conducted to assess the differences between these two modeled conditions. The modeling of the two baseline conditions yielded similar results with two exceptions. The first difference was in the water deliveries to the individual California agencies participating in the water transfers. The second difference is reduced river flow (about 200,000 to 300,000 afy) below Parker Dam associated with change in delivery points resulting from the water transfers. A summary of this comparative analysis is presented in Attachment L.

- To test the sensitivity of the results to the use of a 1083-foot shortage protection level, model runs were also conducted with a protection level of

1050 feet msl. With the 1050-foot protection level, the water levels on Lake Mead in 2016 were essentially the same under the baseline condition and Flood Control Alternative; between 10 and 20 feet lower for the Shortage Protection and California alternatives; and intermediate for the Six State Alternative. Water level plots for reservoir levels using the 1050-foot Lake Mead protection level are in Attachment M.

- Interim surplus criteria had no effect on Upper Basin deliveries as expected, including the Indian demands above Lake Powell. As noted in Section 3.4.4.4, the normal delivery schedules of all Upper Basin diversions would be met under most water supply conditions. Only under periods of low hydrologic inflow conditions and inadequate regulating reservoir storage capacity upstream of the diversion point, would an Upper Basin diversion be shorted. Although the model is not presently configured to track the relative priorities under those conditions, such effects are identical under baseline and all alternatives.

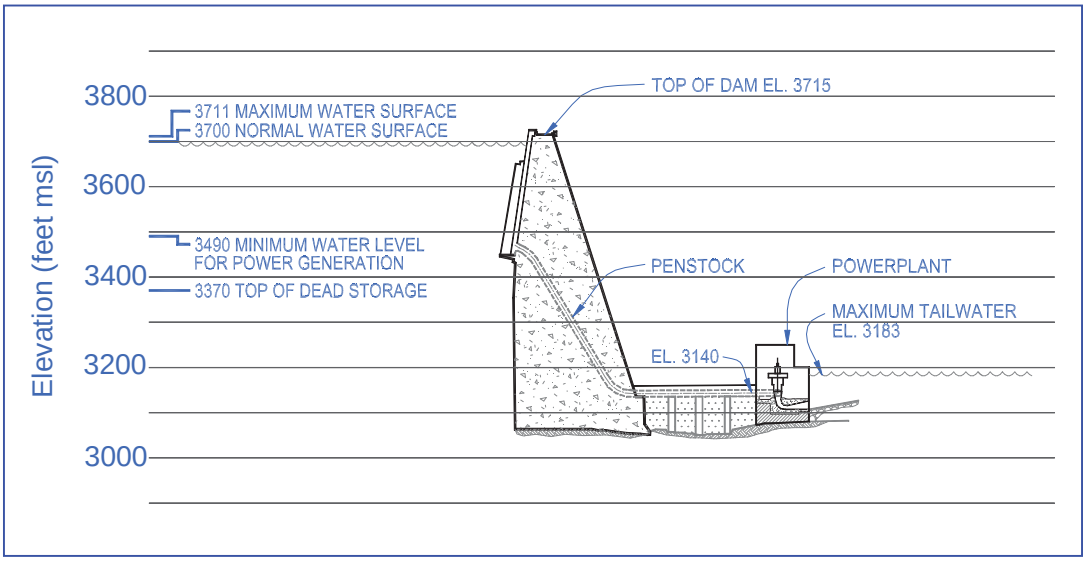
- Under normal conditions, deliveries to the Lower Basin users are always equal to the normal depletion schedules, including those for the Indian tribes. Under shortage conditions, only CAP and SNWA share in the shortage until CAP goes to zero (which was not observed in any of the modeling runs done for this FEIS). Therefore, all tribes in the 10 Tribe Partnership in the Lower Basin receive their scheduled depletion, with the exception of the Cocopah Tribe which has some Arizona Priority 4 water (see Section 3.14.2). As discussed above, as a modeling assumption, all Arizona shortages were assigned to CAP for this FEIS.

3.3.4.2 LAKE POWELL WATER LEVELS

3.3.4.2.1 Dam and Reservoir Configuration

Glen Canyon Dam is a concrete arch dam rising approximately 700 feet above the level of the Colorado River streambed. A profile of the dam is depicted on Figure 3.3-3. Except during flood conditions, the "full reservoir" water level is 3700 feet msl, corresponding to the top of the spillway gates. Under normal operating conditions, releases from Glen Canyon Dam are made through the Glen Canyon Powerplant by means of gates on the upstream face of the dam. The minimum water level at which hydropower can be generated is elevation 3490 feet msl. Releases in excess of the powerplant capacity may be made when flood conditions are caused by high runoff in the Colorado River Basin, or when needed to provide Beach/Habitat Building Flows (BHBF) downstream of the dam, as is discussed in Section 3.6.

Figure 3.3-3
Lake Powell and Glen Canyon Dam Important Operating Elevations



3.3.4.2.2 **Historic Water Levels**

Glen Canyon Dam and Lake Powell were designed to operate from a normal maximum water surface elevation of 3700 feet msl to a minimum elevation of 3490 feet msl, the minimum for hydropower production. During flood conditions, the water surface elevation of Lake Powell can exceed 3700 feet msl by raising the spillway radial gates. Since first reaching equalization storage with Lake Mead in 1974, the reservoir water level has fluctuated from a high of 3708 feet msl to a low of approximately 3612 feet msl, as shown on Figure 3.3-4.

3.3.4.2.3 **Baseline Conditions**

Under the baseline conditions, the water surface elevation of Lake Powell is projected to fluctuate between full level and decreasingly lower levels during the period of analysis (2002 to 2050). Figure 3.3-5 illustrates the range of water levels by three lines, labeled 90th Percentile, 50th Percentile and 10th Percentile. The 50th percentile line shows the median water level for each future year. The median water level under baseline conditions is shown to decline to approximately 3663 feet msl by 2019 and remaining at this or slightly higher levels through 2050. The 10th percentile line shows there is a 10 percent probability that the water level would drop to 3615 feet msl by 2016 and to 3553 feet msl by 2050. Generally, there is about a 20-foot difference between the annual high and low water levels at Lake Powell. It should also be noted that the Lake Powell elevations depicted in Figures 3.3-5 to 3.3-8 are for modeled lake water levels at the end-of-July. The Lake Powell water level generally reaches its seasonal high in July whereas the seasonal lows occur at the end of the year.

Figure 3.3-4
Historic Lake Powell Water Levels

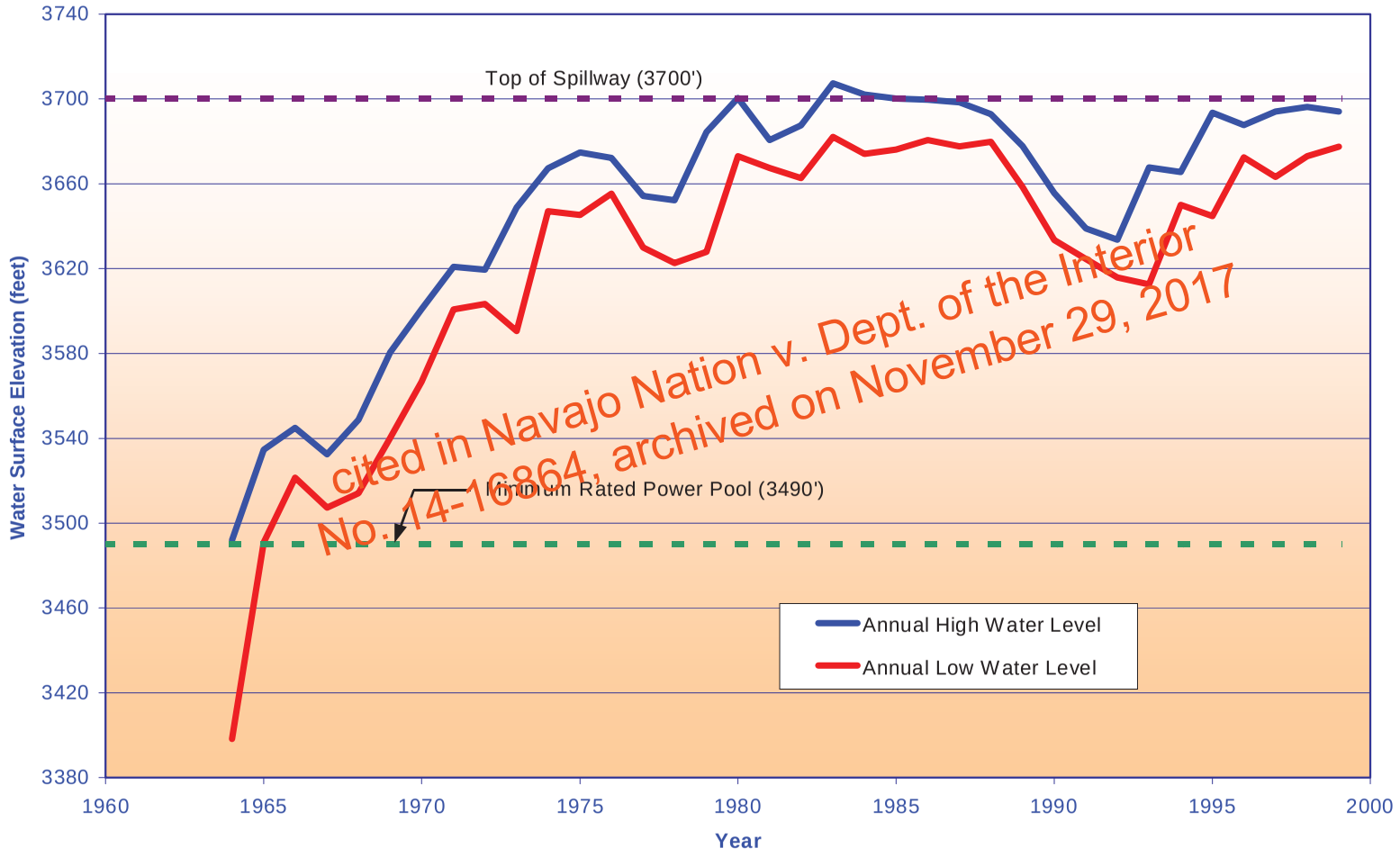
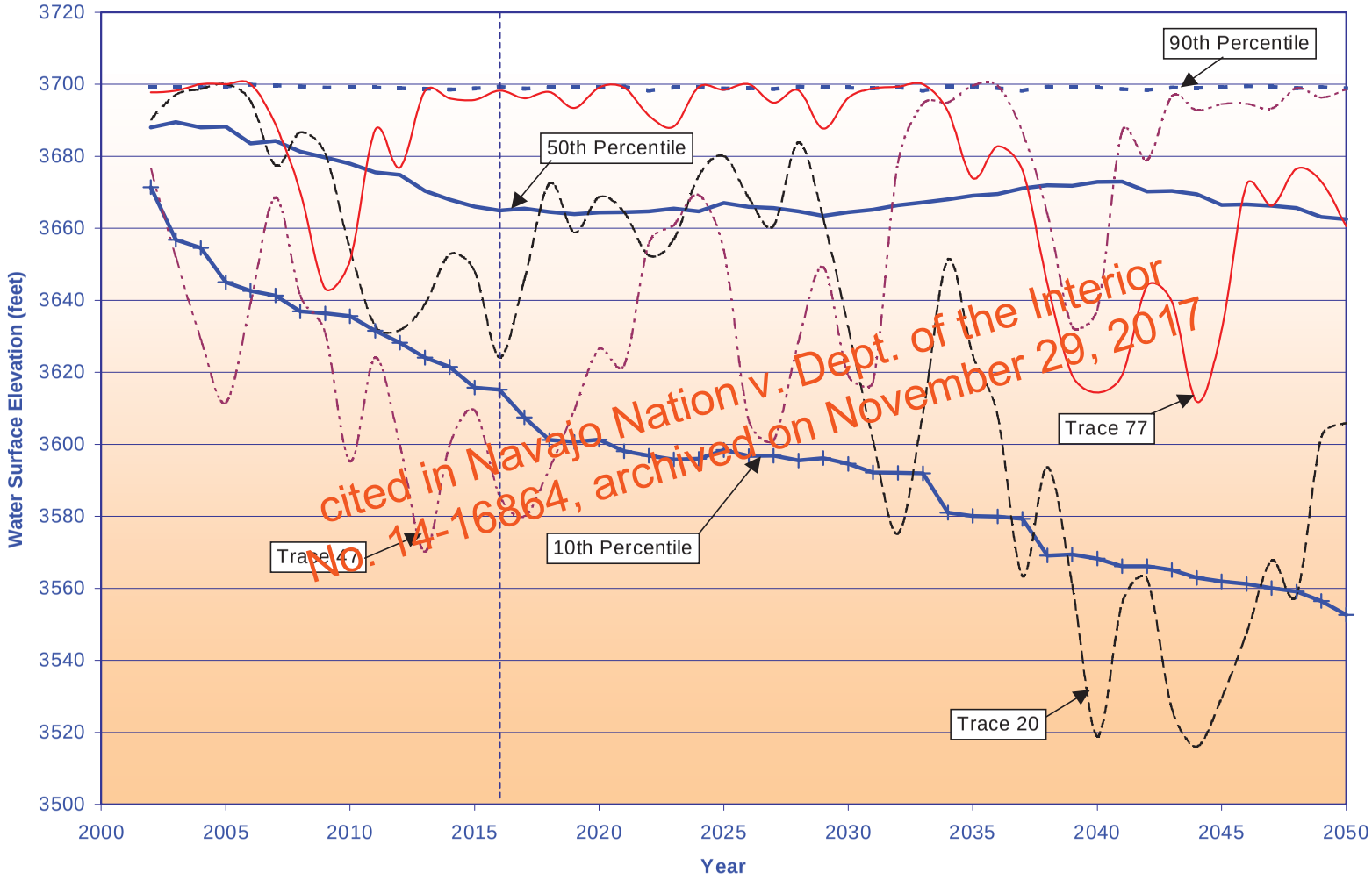


Figure 3.3-5
Lake Powell End-of-July Water Elevations Under Baseline Conditions
90th, 50th and 10th Percentile Values and Representative Traces



Three distinct traces were added to Figure 3.3-5 to illustrate what was actually simulated under the various traces and respective hydrologic sequences and to highlight that the 90th, 50th and 10th percentile lines do not represent actual traces, but rather the ranking of the data from the 85 traces for the conditions modeled. The traces also illustrate the variability among the different traces and that the reservoir levels could temporarily decline below the 10th percentile line. The trace identified as Trace 20 represents the hydrologic sequence that begins in year 1926. The trace identified as Trace 47 represents the hydrologic sequence that begins in year 1953. The trace identified as Trace 77 represents the hydrologic sequence that begins in year 1983.

In Figure 3.3-5, the 90th and 10th percentile lines bracket the range where 80 percent of the water levels simulated for the baseline conditions occur. The highs and lows shown on the three traces would likely be temporary conditions. The reservoir level would tend to fluctuate in the range through multi-year periods of above average and below average inflows. Neither the timing of water level variations between the highs and the lows, nor the length of time the water level would remain high or low can be predicted. These events would depend on the future variation in basin runoff conditions.

Figure 3.3-6 presents a comparison of the 90th, 50th and 10th percentile lines obtained for the baseline conditions to those obtained for the surplus alternatives. This figure is best used for comparing the relative differences in the general lake level trends that result from the simulation of the baseline conditions and surplus alternatives.

As illustrated in Figure 3.3-6, the Flood Control Alternative is the alternative that could potentially result in the highest Lake Powell water levels. The Shortage Protection Alternative and the California Alternative are the alternatives that could potentially result in the lowest water levels. The baseline conditions yield similar levels to those observed under the Flood Control Alternative. The water levels observed under the California alternative are similar to those observed under the Shortage Protective Alternative. The results obtained under the Six States and Basin States alternatives are similar and fall between the Baseline and Shortage Protection alternatives.

Figure 3.3-7 shows the frequency that future Lake Powell end-of-July water elevations would exceed elevation 3695 feet msl under the baseline conditions and surplus alternatives. When the Lake Powell water level is at or exceeds 3695 feet msl, the reservoir is considered to be essentially full. In year 2016, under baseline conditions, the percentage of values greater than or equal to elevation 3695 feet msl is 27 percent. In 2050, the percentage of values greater than or equal to elevation 3695 feet msl is 26 percent.

Figure 3.3-6
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

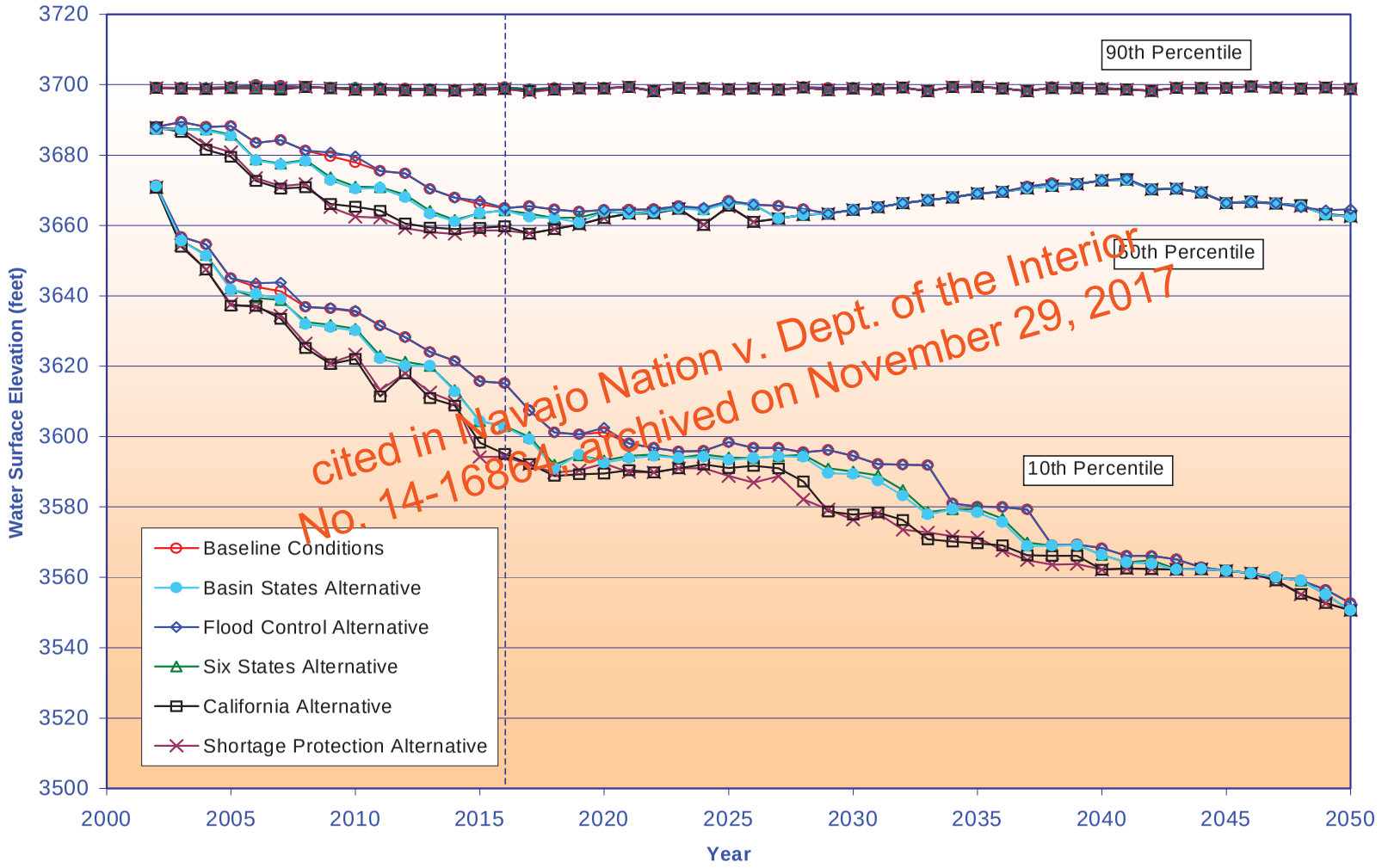


Figure 3.3-7
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 3695 Feet

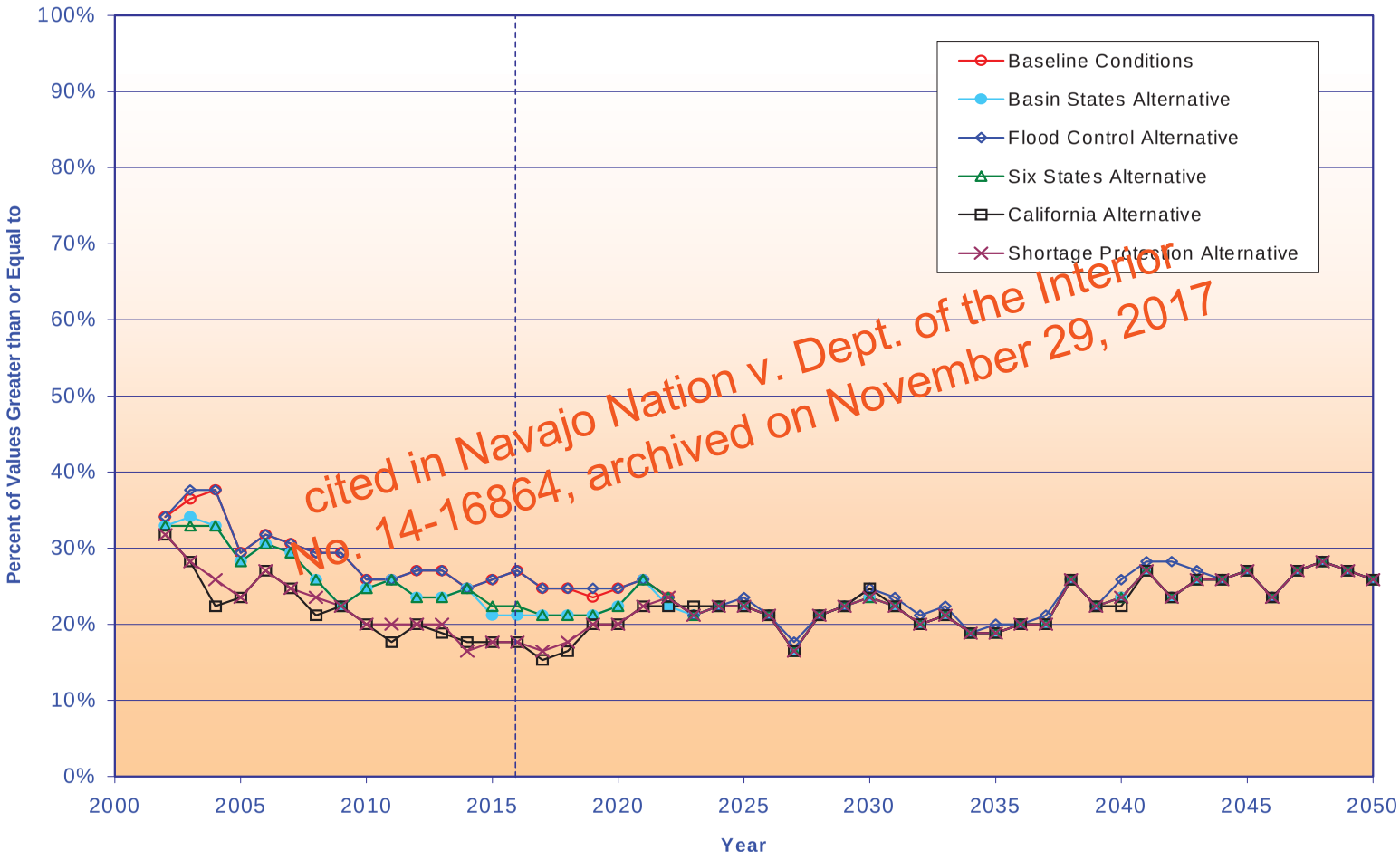


Figure 3.3-8 provides a comparison of the frequency that future Lake Powell end-of-July water elevations under baseline conditions and the surplus alternatives would be at or exceed a lake water elevation of 3612 feet msl. Lake Powell water surface elevation 3612 feet msl is used in this analysis as the low threshold elevation for marina and boat ramps at Lake Powell. This threshold elevation of 3612 feet msl is used to evaluate the baseline conditions and the effects of interim surplus criteria alternatives on shoreline facilities at Lake Powell in the Environmental Consequences section (Section 3.9.2.3.1). The lines represent the percentage of values greater than or equal to the lake water elevation of 3612 feet msl under the baseline conditions and surplus alternatives. In year 2016, under the baseline conditions, the percentage of values greater than or equal to elevation 3612 feet msl is 91 percent. In 2050, the percentage of values greater than or equal to elevation 3612 feet msl decreases to 72 percent for the baseline conditions.

3.3.4.2.4 Comparison of Surplus Alternatives to Baseline Conditions

Figure 3.3-6 compared the 90th, 50th and 10th percentile water levels of the surplus alternatives to those of the baseline conditions. As discussed above, under baseline conditions, future Lake Powell water levels at the upper and lower 10th percentiles would likely be temporary and the water level would fluctuate between them in response to multi-year variations in basin runoff conditions. The same would apply to all the surplus alternatives. The 90th percentile, median (50th percentile) and 10th percentile values of the surplus alternatives are compared to those of the baseline conditions in Table 3.3-4. The values presented in this table include those for years 2016 and 2050 only.

Table 3.3-4
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
90th, 50th and 10th Percentile Values

Alternative	Year 2016			Year 2050		
	90th Percentile	50th Percentile	10th Percentile	90th Percentile	50th Percentile	10th Percentile
Baseline Conditions	3699	3665	3615	3699	3663	3553
Basin States	3699	3664	3603	3699	3663	3551
Flood Control	3699	3665	3615	3699	3665	3553
Six States	3699	3664	3603	3699	3663	3551
California	3699	3660	3595	3699	3663	3551
Shortage Protection	3699	3659	3594	3699	3663	3551

Figure 3.3-7 compared the percentage of Lake Powell elevations that exceeded 3695 feet msl for the surplus alternatives and baseline conditions. Table 3.3-5 provides a summary of that comparison for years 2016 and 2050.

Figure 3.3-8
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 3612 Feet

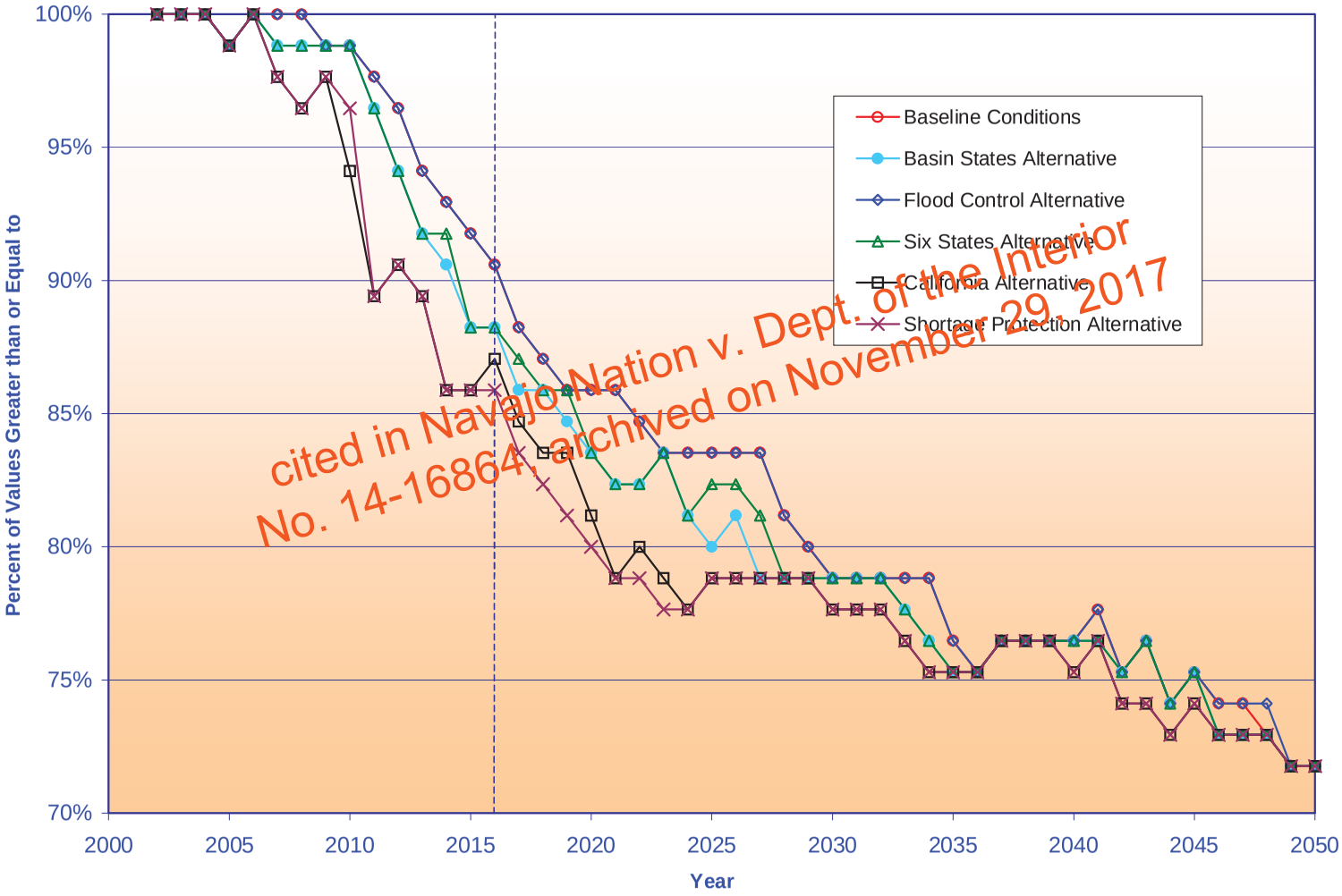


Table 3.3-5
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 3695 Feet

Alternative	Year 2016	Year 2050
Baseline Conditions	27%	26%
Basin States Alternative	21%	26%
Flood Control Alternative	27%	26%
Six States Alternative	22%	26%
California Alternative	18%	26%
Shortage Protection Alternative	18%	26%

Figure 3.3-8 compared the percentage of Lake Powell elevations that exceeded 3612 feet msl for the surplus alternatives and baseline conditions. Table 3.3-6 provides a summary of that comparison for years 2016 and 2050.

Table 3.3-6
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 3612 Feet

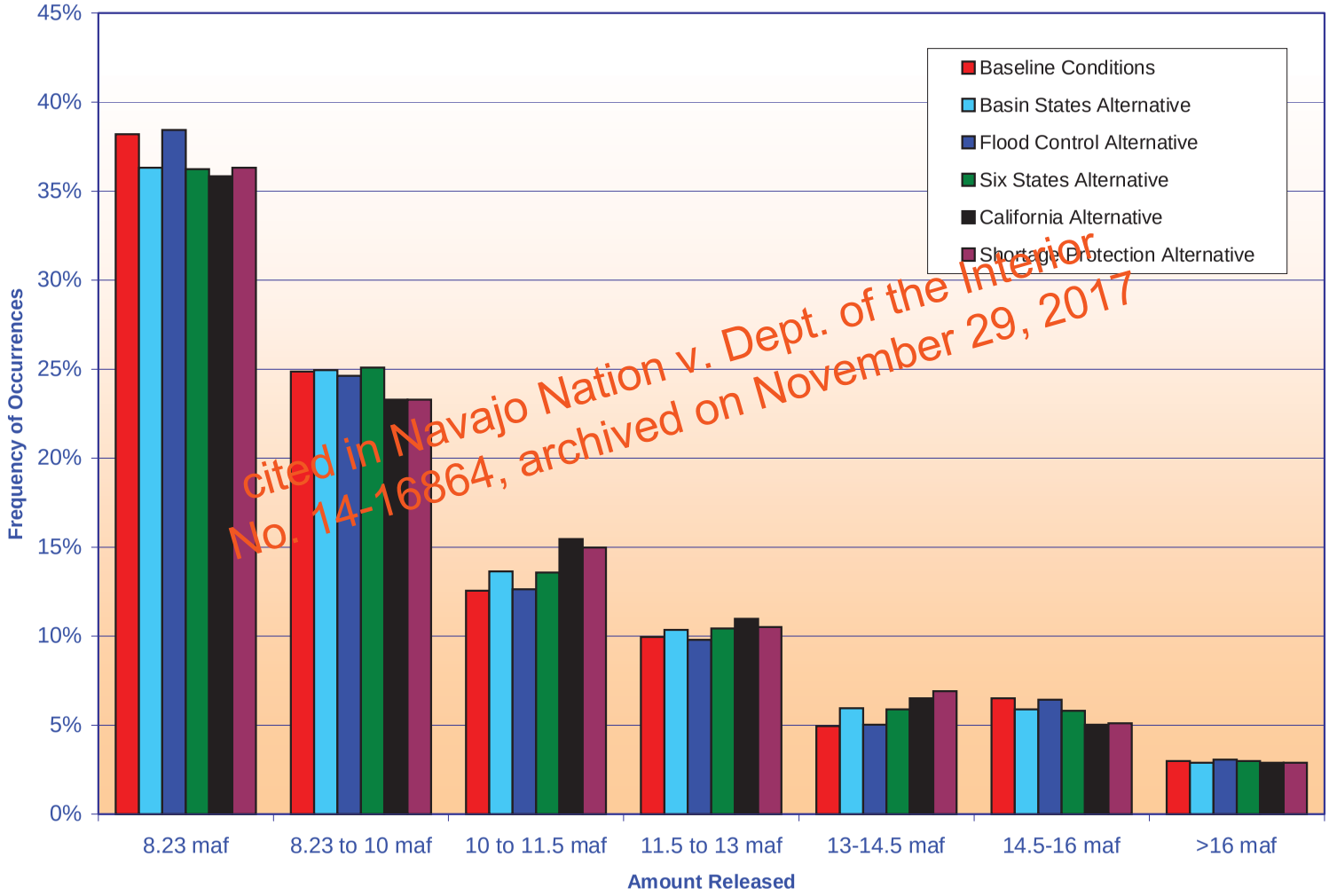
Alternative	Year 2016	Year 2050
Baseline Conditions	91%	72%
Basin States Alternative	88%	72%
Flood Control Alternative	91%	72%
Six States Alternative	88%	72%
California Alternative	87%	72%
Shortage Protection Alternative	86%	72%

3.3.4.3 River Flows Between Lake Powell and Lake Mead

The river flows between Glen Canyon Dam and Lake Mead result from controlled releases from Glen Canyon Dam (Lake Powell) and include gains from tributaries in this reach of the river. Releases from Glen Canyon Dam are managed as previously discussed in Sections 3.2.1.2 and 3.3.1.1. The most significant gains from perennial streams include inflow from the Little Colorado River and Paria River. However, inflow from these streams is concentrated over very short periods of time, and on average, make up approximately two percent of the total annual flow in this reach of the river.

Figure 3.3-9 provides a comparison of the relative frequency of occurrence of annual releases from Lake Powell under the baseline conditions and surplus alternatives, during the interim surplus criteria period (through 2016). Releases between 8.23 and 11.5 maf generally correspond to years where equalization releases are being made from Lake Powell. The surplus water deliveries from Lake Mead associated with the interim surplus criteria tend to increase the relative frequency of equalization during that period compared to baseline conditions.

Figure 3.3-9
Histogram of Modeled Lake Powell Annual Releases (Water Years)
2002 to 2016 (85 Traces)



3.3.4.4 LAKE MEAD WATER LEVELS

This section provides a general description of Hoover Dam and Lake Mead, discusses historic Lake Mead water levels and summarizes the results of the future Lake Mead water level simulations under baseline conditions and the surplus alternatives.

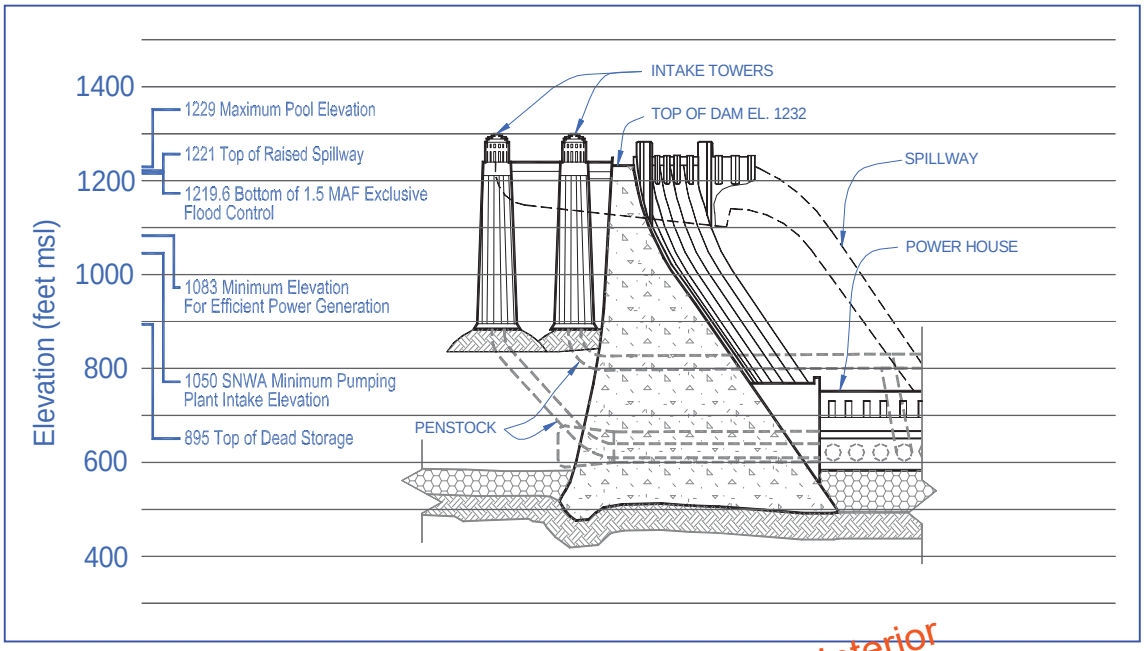
3.3.4.4.1 Dam and Reservoir Configuration

Hoover Dam and Lake Mead are operated with the following three main priorities: 1) river regulation, improvement of navigation, and flood control, 2) irrigation and domestic uses, including the satisfaction of present perfected water rights, and 3) power. The Boulder Canyon Project Act of 1928 specified flood control as the project purpose having first priority for operation of Hoover Dam and Lake Mead.

Hoover Dam is the northernmost Reclamation facility on the lower Colorado River and is located 326 miles downstream of Lee Ferry. Hoover Dam provides flood control protection and Lake Mead provides the majority of the storage capacity for the Lower Basin as well as significant recreation opportunities. Lake Mead storage capacity is 27.38 maf at a maximum water surface elevation of 1229.0 feet msl. At this elevation, Lake Mead's water surface area would equal 163,000 acres. The dam's four intake towers draw water from the reservoir at elevations above 895 feet to drive 17 generators within the dam's powerplant. The minimum water surface elevation for effective power generation is 1083 feet msl.

Flood control regulations for Lake Mead were established to manage potential flood events arising from rain and snowmelt. Lake Mead's uppermost 1.5 maf of storage capacity, between elevations 1219.61 and 1229.0 feet, is defined as exclusive flood control. Within this capacity allocation, 1.218 maf of flood storage is above elevation 1221.0 feet, the top of the raised spillway gates. Figure 3.3-10 illustrates some of the important Hoover Dam and Lake Mead water surface elevations that are referenced in subsequent sections.

Figure 3.3-10
Lake Mead and Hoover Dam Important Operating Elevations



Lake Mead usually is at its maximum water level in November and December. If required, system storage space-building is achieved between August 1 to January 1. Hoover Dam storage space-building releases are limited to 28,000 cfs, while the mean daily releases to meet the water delivery orders of Colorado River water entitlement holders normally range between 8000 cfs to 18,000 cfs.

In addition to controlled releases from Lake Mead to meet water supply and power requirements, water is also diverted from Lake Mead at the SNWA Saddle Island intake facilities, Boulder City's Hoover Dam intake, and the Basic Management, Inc.'s (BMI) intake facility for use in the Las Vegas area for domestic purposes by SNWA, BMI and other users.

The diversions by SNWA at its Saddle Island intake facilities entail pumping the water from the intake to SNWA's transmission facilities for treatment and further conveyance to the Las Vegas area. The elevation of the original SNWA intake is approximately 1000 feet msl. However, the minimum required Lake Mead water level necessary to operate the pumping units at SNWA's original intake facility is 1050 feet msl. SNWA recently constructed a second pumping plant with an intake elevation of 950 feet msl. The minimum required Lake Mead water level necessary to operate the pumping units at SNWA's second intake facility is 1000 feet msl. The new SNWA intake provides only a portion of the capacity required by SNWA to meet its Lake Mead water supply needs. Therefore, the intake elevation of SNWA's original pumping plant is critical to its ability to divert its full Colorado River water entitlement.

3.3.4.4.2 Historic Lake Mead Water Levels

Figure 3.3-11 presents an overview of the historic annual water levels (annual maximum and minimum) of Lake Mead. As noted in Figure 3.3-11, the annual change in elevations of Lake Mead has ranged from less than ten feet to as much as 75 feet msl. The decrease in the range of the elevations within a year observed after the mid-1960s can be attributed to the regulation provided by Lake Powell.

Historic Lake Mead low water levels have dropped to the minimum rated power elevation (1083 feet msl) of the Hoover Powerplant during two periods (1954 to 1957 and 1965 to 1966). The maximum Lake Mead water surface elevation of approximately 1225.6 feet msl occurred once, in 1983.

Three Lake Mead water surface elevations of interest are shown in Figure 3.3-11. The first elevation is 1221 feet msl, the top of the spillway gates. The second elevation is 1083 feet msl, the minimum elevation for the effective generation of power. The third elevation is 1050 feet msl, the minimum elevation required for the operation of SNWA's original intake facility.

3.3.4.4.3 Baseline Conditions

Under the baseline conditions, the water surface elevation of Lake Mead is projected to fluctuate between full level and decreasingly lower levels during the period of analysis (2002 to 2050). Figure 3.3-12 illustrates the range of water levels (end of December) by three lines, labeled 90th Percentile, 50th Percentile and 10th Percentile. The 50th percentile line shows the median water level for each future year. The median water level under baseline conditions is shown to decline to 1162 feet msl by 2016 and to 1111 feet msl by 2050. The 10th percentile line shows there is a 10 percent probability that the water level would decline to 1093 feet msl by 2016 and to 1010 feet msl by 2050. It should also be noted that the Lake Mead elevations depicted in Figure 3.3-12 represent water levels at the end of December which is when lake levels are at a seasonal high. Conversely, the Lake Mead water level generally reaches its annual low in July.

Three distinct traces are added to Figure 3.3-12 to illustrate what was actually simulated under the various traces and respective hydrologic sequences and to highlight that the 90th, 50th and 10th percentile lines do not represent actual traces, but rather the ranking of the data from the 85 traces for the conditions modeled. The three traces illustrate the variability among the different traces and that the reservoir levels could temporarily decline below the 10th percentile line. The trace identified as Trace 20 represents the hydrologic sequence that begins in year 1926. The trace identified as Trace 47 represents the hydrologic sequence that begins in year 1953. The trace identified as Trace 77 represents the hydrologic sequence that begins in year 1983.

Figure 3.3-11
Historic Lake Mead Water Levels
(Annual Highs and Lows)

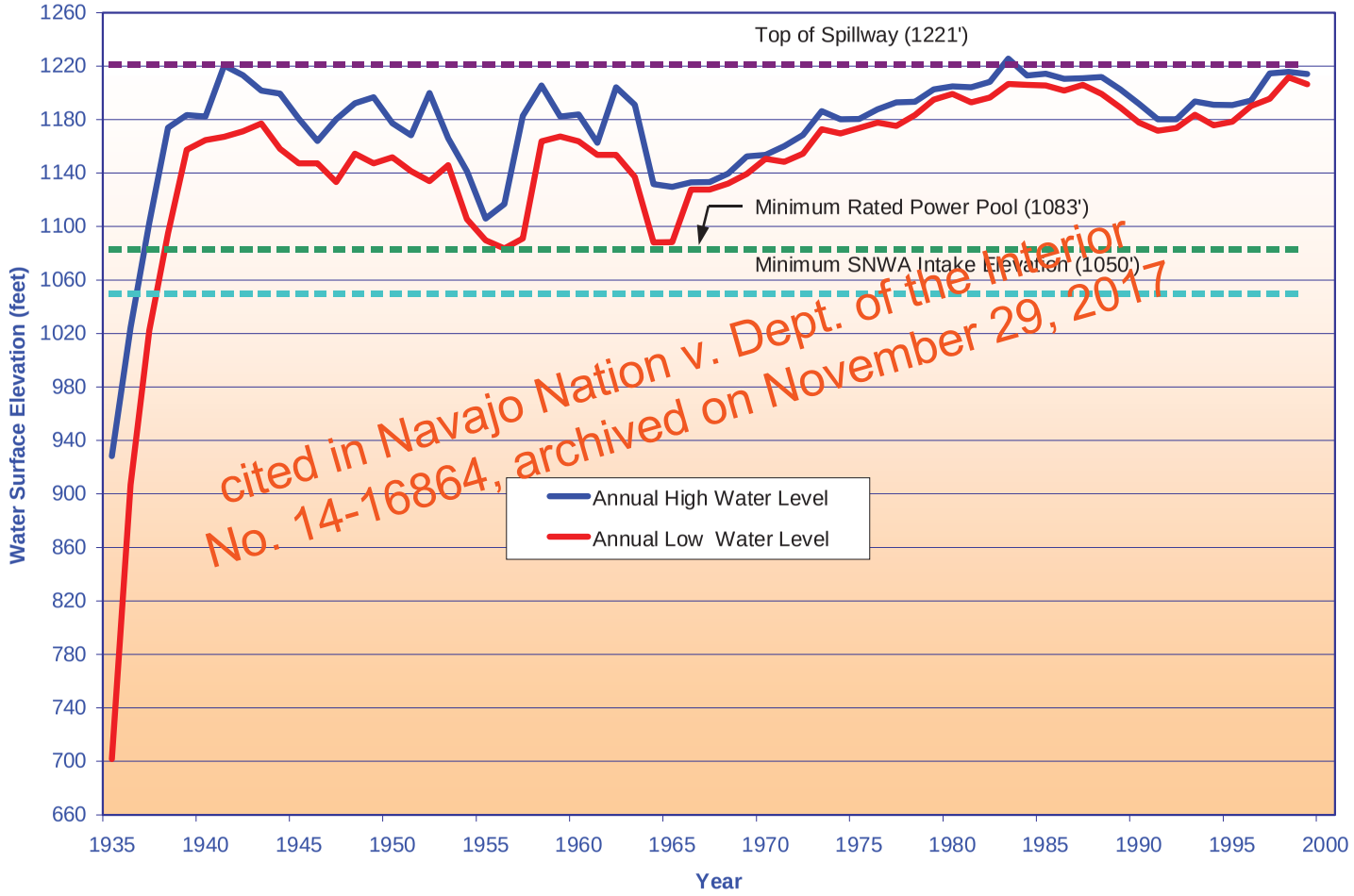
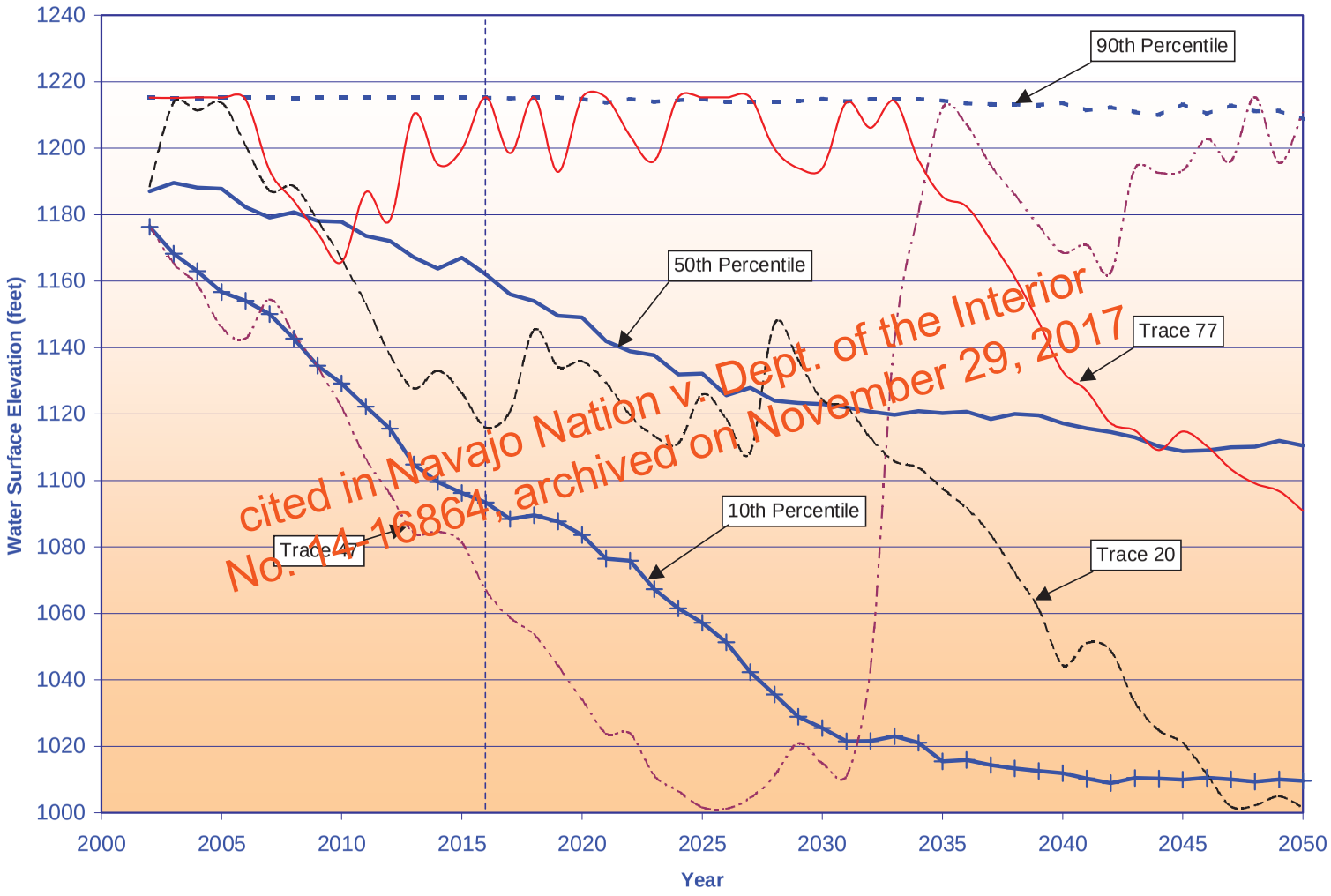


Figure 3.3-12
Lake Mead End-of-December Water Elevations Under Baseline Conditions
90th, 50th and 10th Percentile Values and Representative Traces



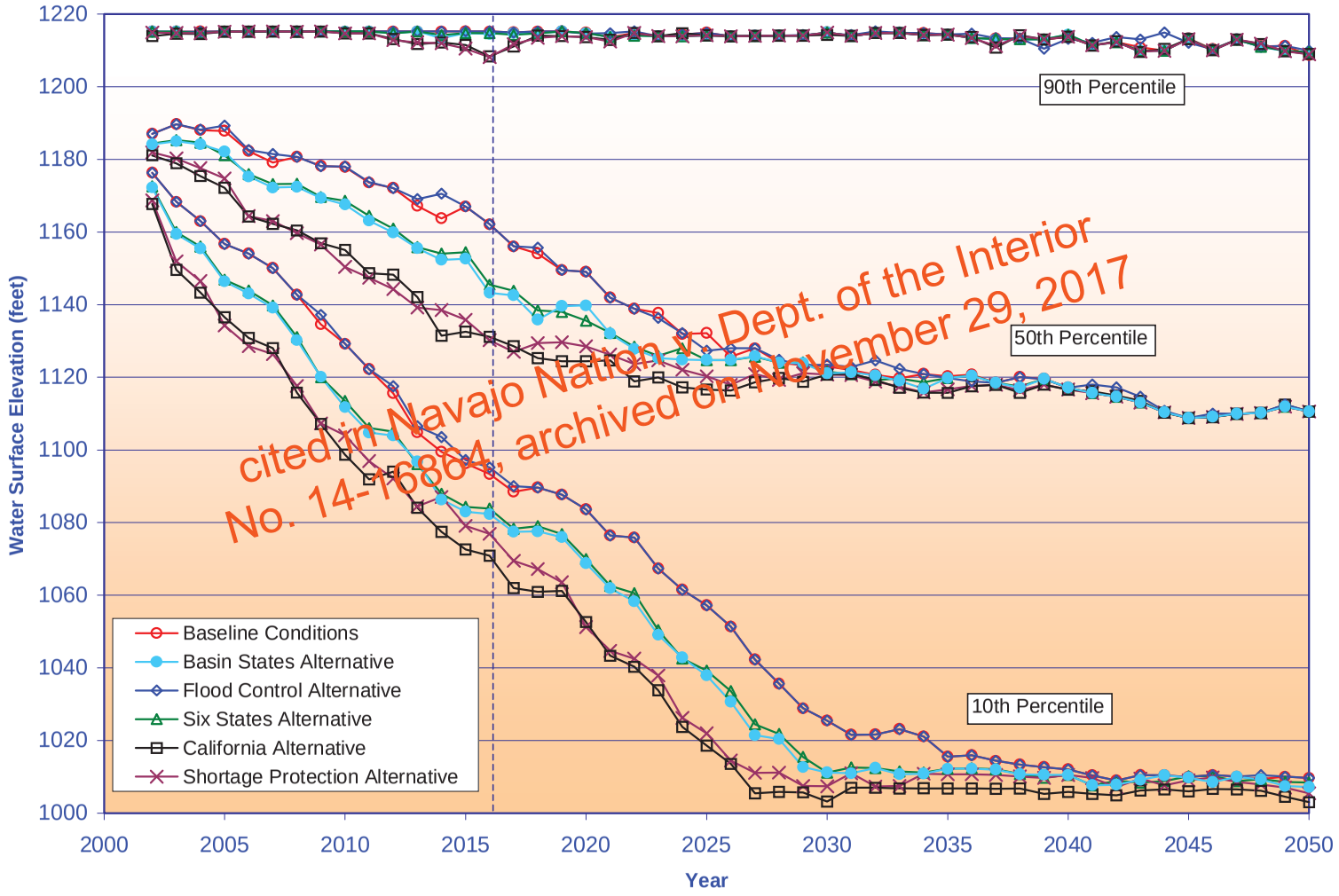
In Figure 3.3-12, the 90th and 10th percentile lines bracket the range where 80 percent of future Lake Mead water levels simulated for the baseline conditions occur. The highs and lows shown on the three traces would likely be temporary conditions. The reservoir level would tend to fluctuate through multi-year periods of above average and below average inflows. Neither the timing of water level variations between the highs and the lows, nor the length of time the water level would remain high or low can be predicted. These events would depend on the future variation in basin runoff conditions.

Figure 3.3-13 presents a comparison of the 90th, 50th and 10th percentile lines obtained for the baseline conditions to those obtained for the surplus alternatives. This figure is best used for comparing the relative differences in the general lake level trends that result from the simulation of the baseline conditions and surplus alternatives.

As illustrated in Figure 3.3-13, the Flood Control Alternative is the alternative that could potentially result in the highest Lake Mead water levels. The California Alternative is the alternative that could potentially result in the lowest water levels. The water levels observed under the Shortage Protection Alternative are similar to those of the California Alternative with some years slightly lower. The baseline conditions yield slightly lower levels than the Flood Control Alternative, but the differences are very small. The results obtained under the Six States and Basin States alternatives are similar and fall between the Flood Control and Shortage Protection alternatives.

Figure 3.3-14 provides a comparison of the frequency that future Lake Mead end of December water elevations under baseline conditions and the surplus alternatives would be at or exceed a lake water elevation of 1200 feet msl. The lines represent the percentage of values greater than or equal to the lake water elevation of 1200 feet msl under the baseline conditions and surplus alternatives. In year 2016, under the baseline conditions, the percentage of values greater than or equal to elevation 1200 feet msl is 22 percent. In 2050, the percentage of values greater than or equal to elevation 1200 feet msl decreases to 14 percent for the baseline conditions.

Figure 3.3-13
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions 90th, 50th and 10th Percentile Values



3.3-14
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1200 Feet

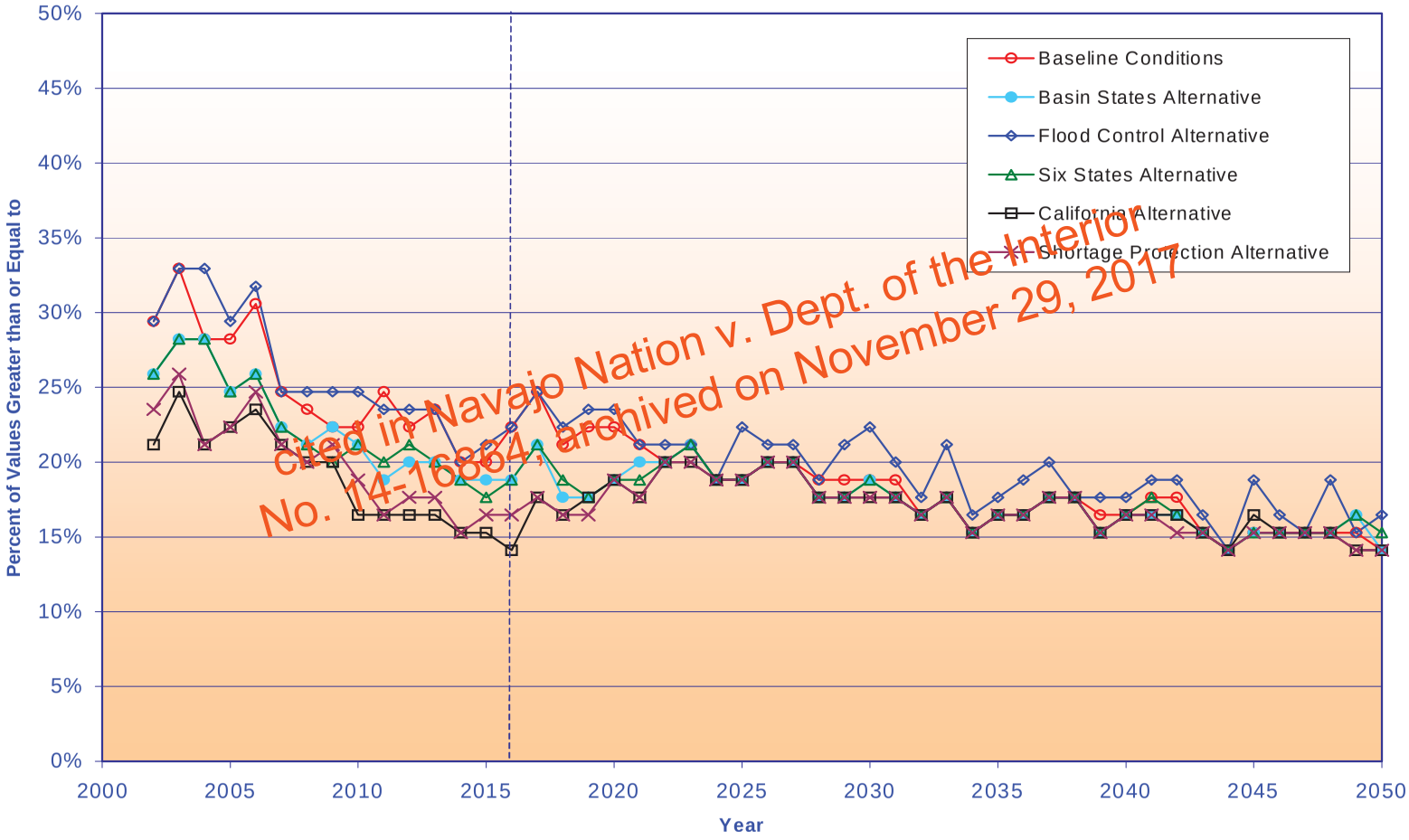


Figure 3.3-15 provides a comparison of the frequency that future Lake Mead end of December water elevations would be at or exceed a lake water elevation of 1083 feet msl under baseline conditions and the surplus alternatives. In year 2016, under the baseline conditions, the percentage of values greater than or equal to elevation 1083 feet msl is 93 percent. In 2050, the percentage of values greater than or equal to elevation 1083 feet msl decreases to 58 percent for the baseline conditions.

Figure 3.3-16 provides a comparison of the frequency that future Lake Mead end of December water elevations under baseline conditions and the surplus alternatives would be at or exceed a lake water elevation of 1050 feet msl. In year 2016, under the baseline conditions, the percentage of values greater than or equal to elevation 1050 feet msl is 100 percent. In 2050, the percentage of values greater than or equal to elevation 1050 feet msl decreases to 75 percent for the baseline conditions.

Figure 3.3-17 provides a comparison of the frequency that future Lake Mead end of December water elevations under baseline conditions and the surplus alternatives would be at or exceed a lake water elevation of 1000 feet msl. In year 2016, under the baseline conditions, the percentage of values greater than or equal to elevation 1000 feet msl is 100 percent. In 2050, the percentage of values greater than or equal to elevation 1000 feet msl decreases to 99 percent for the baseline conditions.

3.3.4.4.4 Comparison of Surplus Alternatives to Baseline Conditions

Figure 3.3-13 compared the 90th, 50th and 10th percentile water levels of the surplus alternatives to those of the baseline conditions. As discussed above, under baseline conditions, future Lake Mead water levels at the upper and lower 10th percentiles would likely be temporary and the water levels are expected to fluctuate between them in response to multi-year variations in basin runoff conditions. The same would apply to all the surplus alternatives. The 90th percentile, median (50th percentile) and 10th percentile values of the surplus alternatives are compared to those of the baseline conditions in Table 3.3-7. The values presented in this table include those for years 2016 and 2050 only.

Table 3.3-7
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
90th, 50th and 10th Percentile Values

Alternative	Year 2016			Year 2050		
	90th Percentile	50th Percentile	10th Percentile	90th Percentile	50th Percentile	10th Percentile
Baseline Conditions	1215	1162	1093	1209	1111	1010
Basin States	1215	1143	1082	1209	1111	1007
Flood Control	1215	1162	1095	1210	1111	1010
Six States	1215	1146	1084	1210	1111	1008
California	1208	1131	1071	1209	1111	1003
Shortage Protection	1208	1130	1077	1209	1111	1005

Figure 3.3-15
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1083 Feet

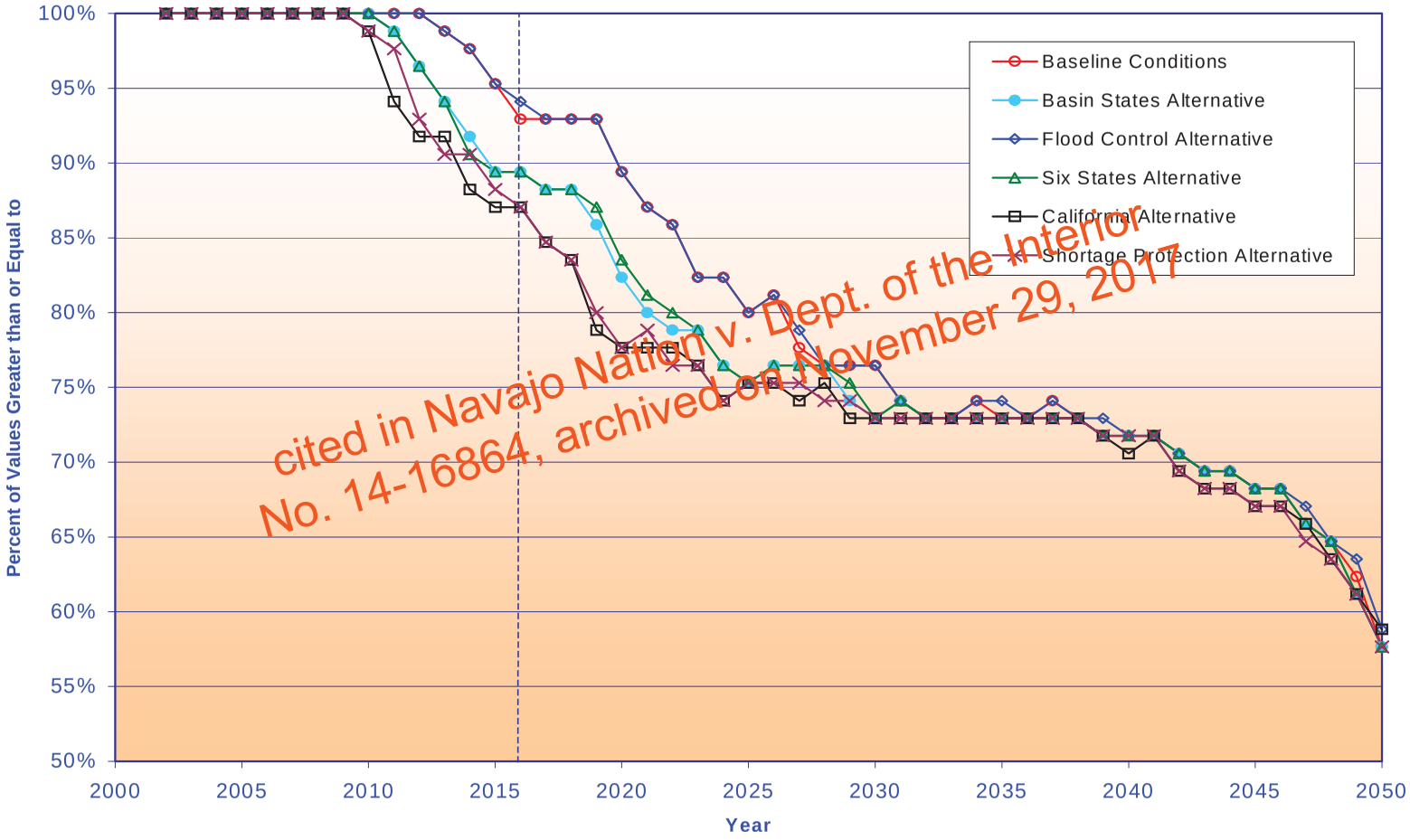


Figure 3.3-16
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1050 Feet

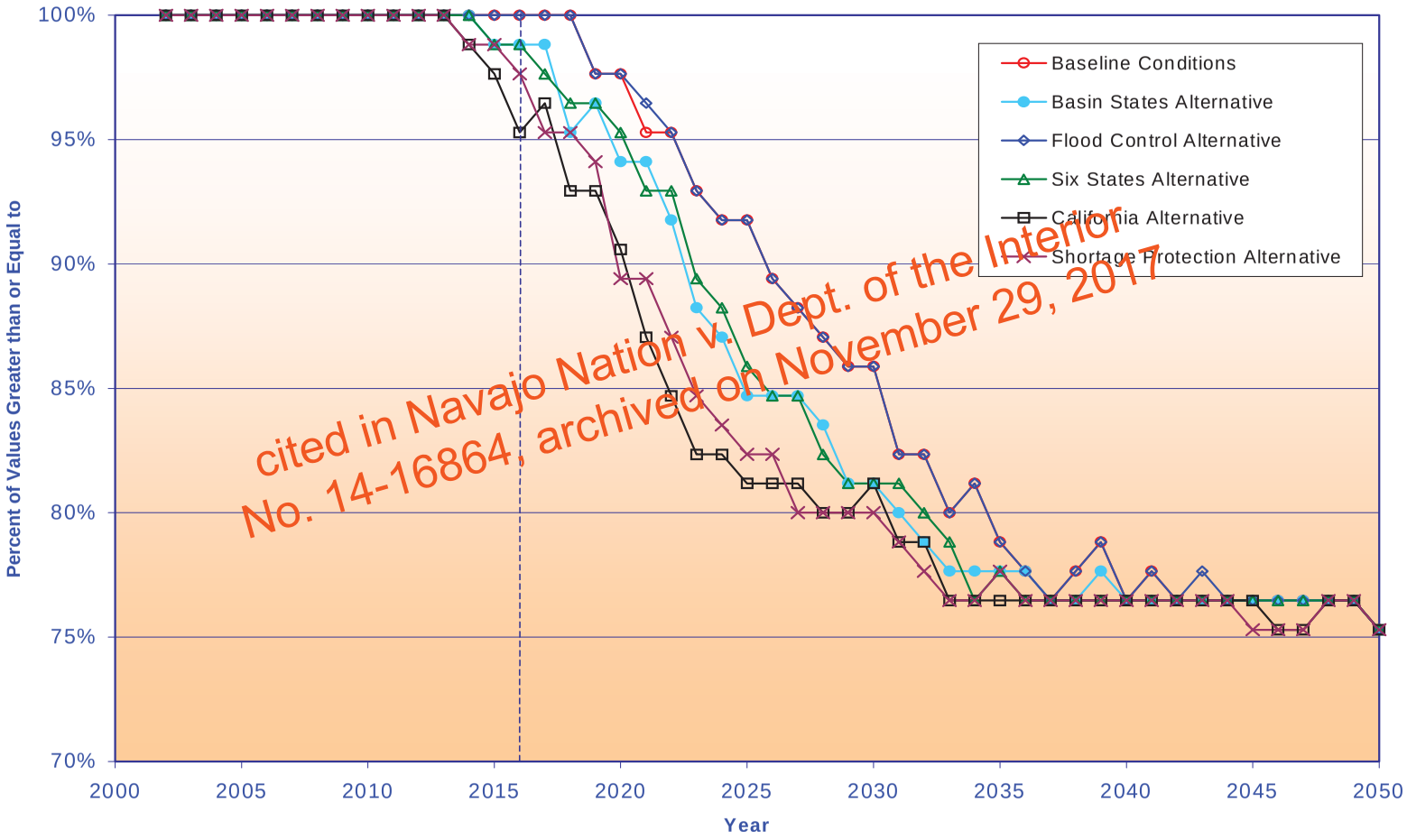


Figure 3.3-17
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1000 Feet

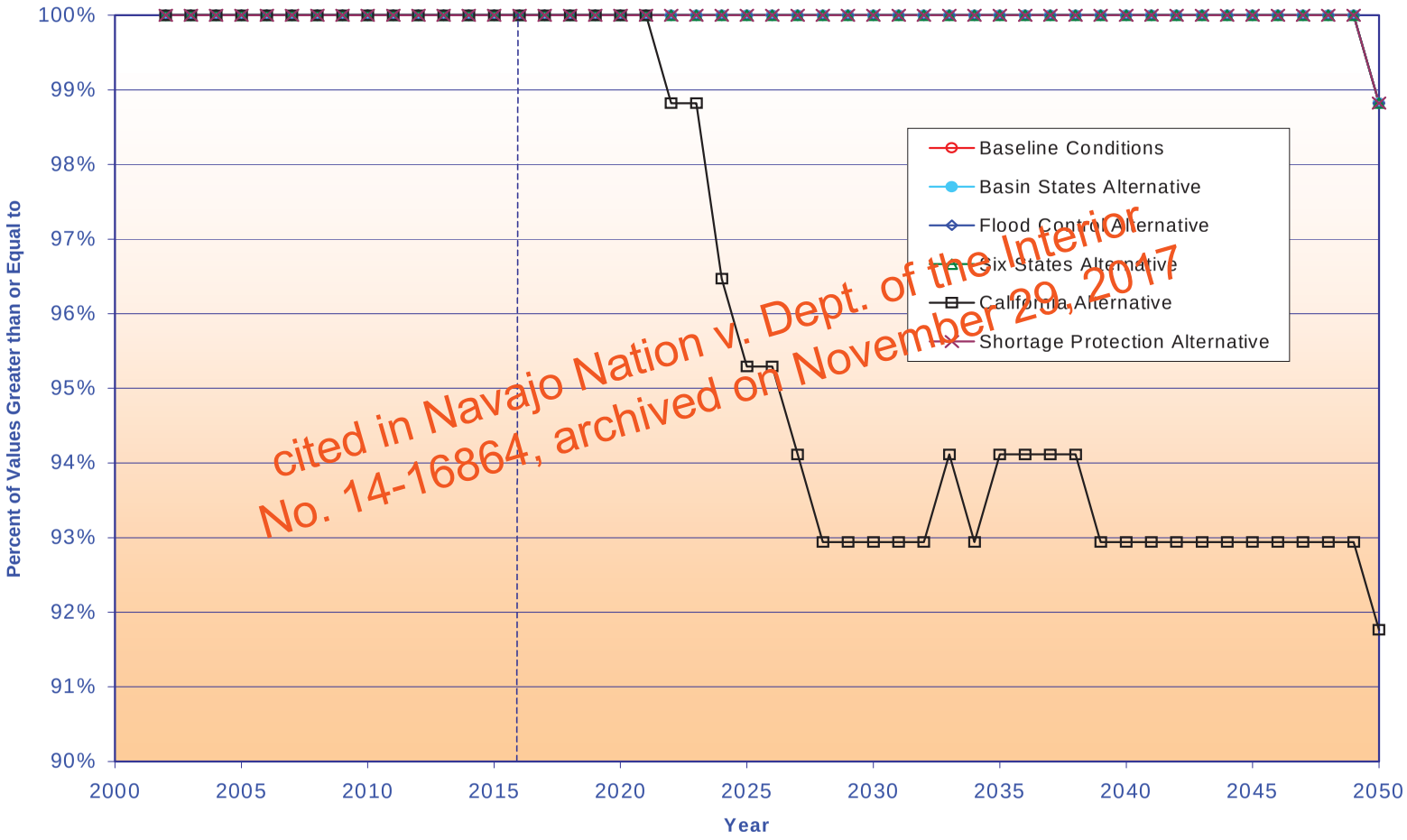


Figure 3.3-14 compared the percentage of Lake Mead elevations that exceeded 1200 feet msl for the surplus alternatives and baseline conditions. Table 3.3-8 provides a summary of that comparison for years 2016 and 2050.

Table 3.3-8
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1200 Feet

Alternative	Year 2016	Year 2050
Baseline Conditions	22%	14%
Basin States	19%	14%
Flood Control	22%	16%
Six States	19%	15%
California	14%	14%
Shortage Protection	16%	14%

Figure 3.3-15 compared the percentage of Lake Mead elevations that exceeded 1083 feet msl for the surplus alternatives and baseline conditions. Table 3.3-9 provides a summary of that comparison for years 2015 and 2050.

Table 3.3-9
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1083 Feet

Alternative	Year 2016	Year 2050
Baseline Conditions	93%	58%
Basin States	89%	58%
Flood Control	94%	59%
Six States	89%	58%
California	87%	59%
Shortage Protection	87%	58%

Figure 3.3-16 compared the percentage of Lake Mead elevations that exceeded 1050 feet msl for the surplus alternatives and baseline conditions. Table 3.3-10 provides a summary of that comparison for years 2016 and 2050.

Table 3.3-10
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1050 Feet

Alternative	Year 2016	Year 2050
Baseline Conditions	100%	75%
Basin States	99%	75%
Flood Control	100%	75%
Six States	99%	75%
California	95%	75%
Shortage Protection	98%	75%

Figure 3.3-17 compared the percentage of Lake Mead elevations that exceeded 1000 feet msl for the surplus alternatives and baseline conditions. Table 3.3-11 provides a summary of that comparison for years 2016 and 2050.

Table 3.3-11
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives and Baseline Conditions
Percentage of Values Greater than or Equal to Elevation 1000 Feet

Alternative	Year 2016	Year 2050
Baseline Conditions	100%	99%
Basin States	100%	99%
Flood Control	100%	99%
Six States	100%	99%
California	100%	92%
Shortage Protection	100%	99%

3.3.4.5 COMPARISON OF RIVER FLOWS BELOW HOOVER DAM

This section describes results of the analysis of the simulated Colorado River flows below Hoover Dam. The model of the Colorado River system was used to simulate future mean monthly flows under baseline conditions and the surplus alternatives. Four specific river locations were selected to represent flows within selected river reaches below Hoover Dam. The river reaches and corresponding flow locations are listed in Table 3.3-12 and are shown graphically on Map 3.3-1.

Table 3.3-12
Colorado River Flow Locations Identified for Evaluation

Colorado River Reach	Selected River Flow Locations	
	Description	Approximate River Mile [1]
ween Hoover Dam and Parker Dam	vasu National Wildlife Refuge (NWR)	242.3
ween Parker Dam and Palo Verde Diversion Dam	stream of Colorado River Indian Reservation	180.8
ween Palo Verde Diversion and Imperial Dam	wnstream of the Palo Verde Diversion Dam	133.8
ween Imperial Dam and SIB	ow the Mexico Diversion at Morelos Dam	23.1

[1] River miles as measured from the southerly international border with Mexico

Two types of analysis of the potential of interim surplus criteria to affect river flows were conducted. In the first analysis, the potential effects on the total annual volume of flow in each reach were evaluated. In this analysis, the mean monthly flows were first summed over each calendar year. The 90th, 50th, and 10th percentiles of the annual volumes were then computed for each year. Plots of these percentiles for baseline

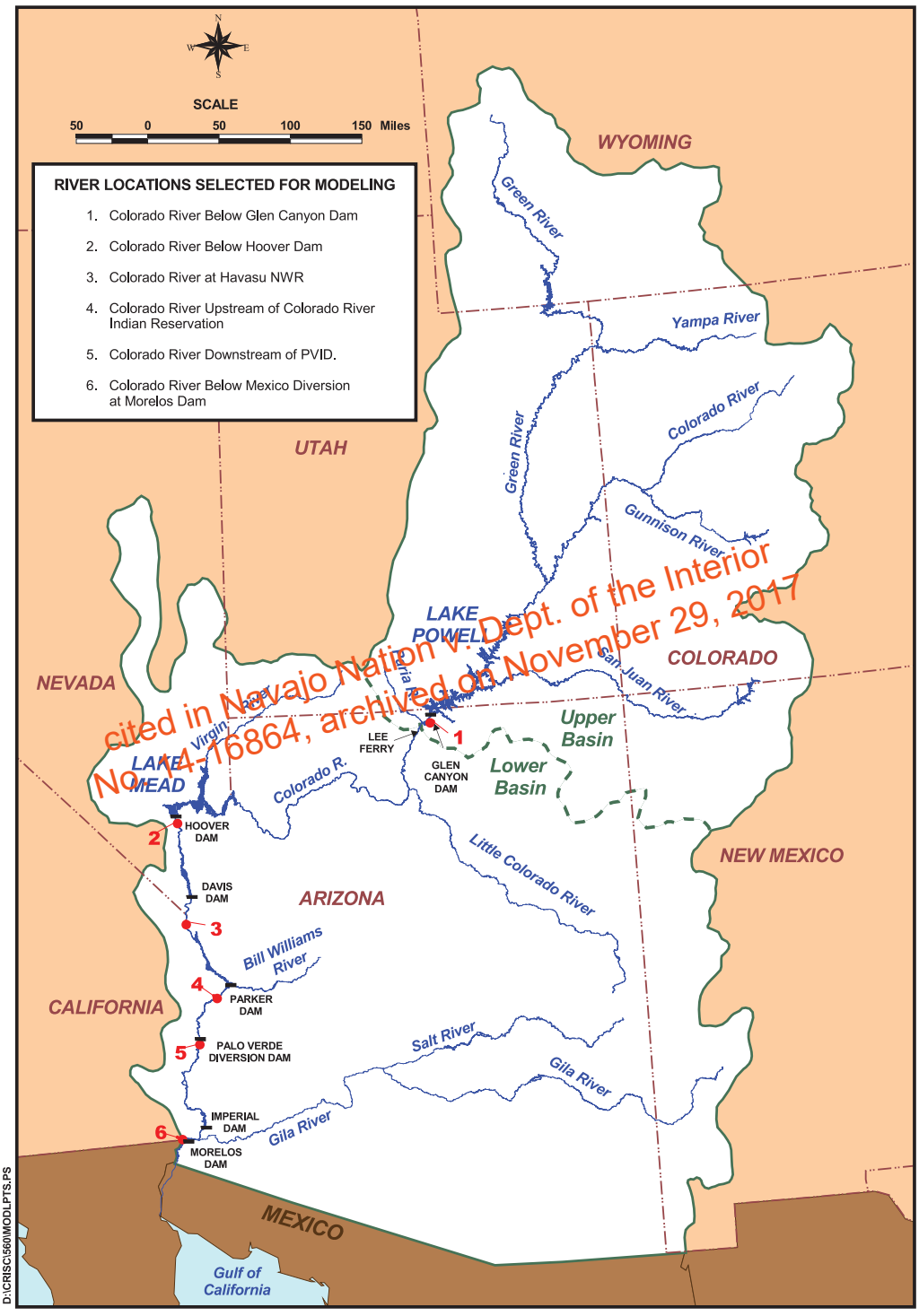
conditions and all surplus alternatives are included in this section for each of the four river points. Cumulative distributions of the annual flow volumes are also presented for specific years to aid in the understanding of the effects. These cumulative distributions consider the year 2006, the year when the largest effects at the 90th percentile are seen.

The second analysis investigated the potential effects on seasonal flows. Cumulative distributions of mean monthly flows (in cfs) were produced for specific years and selected months representative of each season. The mean monthly flows for January were used to represent the winter season flows and likewise for April, July, and October to represent spring, summer, and fall, respectively. The specific years analyzed included 2006, 2016, 2025, and 2050. Only the graphs for 2016 are presented in this section. The graphs for the other years are presented in Attachment N.

It should be noted that the monthly demand schedules used in the model are based on a distribution of the total annual demand (a percentage for each month). Although each diversion point may use a different distribution, those percentages do not change from year to year, and can not reflect potential future changes in the system that might affect the monthly distributions. Therefore, the seasonal differences are primarily governed by the overall changes in annual flow volumes, coupled with the effect of each diversion's distribution upstream of the point of interest.

Daily and hourly releases from Hoover Dam reflect the short-term demands of Colorado River water users with diversions located downstream, storage management in Lakes Mohave and Havasu, and power production at Hoover, Davis and Parker Dams. The close proximity of Lake Mohave to Hoover Dam effectively dampens the short-term fluctuations below Hoover Dam. The scheduling and subsequent release of water through Davis and Parker Dams create short-term fluctuations in river flows, depths, and water surface elevations downstream of these structures. These fluctuations of water surface elevations in the river are most noticeable in the river reaches located immediately downstream of the dams and lessen as the downstream distance increases. Interim surplus criteria, however, will have no effect on the short-term operations of Hoover, Davis and Parker Dam, and therefore, short-term fluctuations in river reaches downstream of Hoover Dam were not evaluated.

Map 3.3-1
Colorado River Locations Selected for Modeling



3.3.4.5.1 River Flows Between Hoover Dam and Parker Dam

The river flows between Hoover Dam and Parker Dam are comprised mainly of flow releases from Hoover Dam and Davis Dam. Inflows from the Bill Williams River and other intermittent tributaries are infrequent and are usually concentrated into short time periods due to their dependence on localized precipitation. Tributary inflows comprise less than one percent of the total annual flow in this reach of the river.

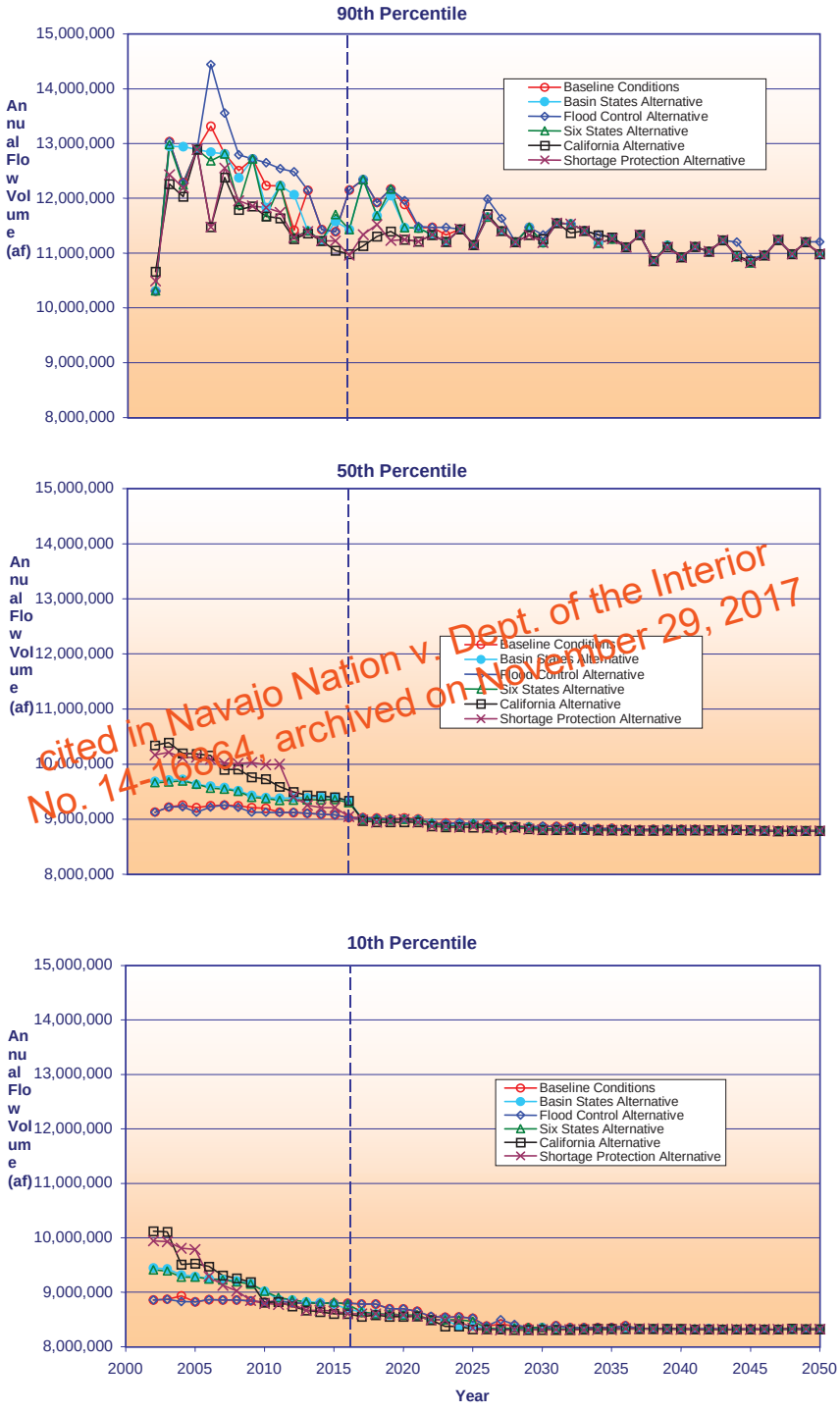
Due to the backwater effect of Lake Mohave, a point on the Colorado River downstream of Davis Dam was used to evaluate the river flows for this reach, located immediately downstream of the Havasu National Wildlife Refuge (NWR).

The 90th, 50th, and 10th percentile annual flow volumes for this reach are shown in Figure 3.3-18. As shown by the 50th percentile values, annual flow volumes in this reach can be expected to be greater for the surplus alternatives (except for the Flood Control Alternative) than for the baseline conditions during the 15-year interim surplus criteria period. This is a direct result of more frequent surplus deliveries. The largest increases from baseline conditions occur under the California Alternative and range from approximately 13 percent in the first two years down to three percent by 2016. Results for the Six States and Basin States alternatives are similar to each other, ranging from approximately a six percent increase over baseline conditions down to three percent by 2016. Beyond the 15-year interim period, the annual flow volumes under the surplus alternatives are essentially the same (within one percent) as those under the baseline conditions.

At the 10th percentile level, although the magnitudes of the annual flow volumes are different, the relative changes in surplus conditions compared to the baseline conditions are similar to those at the 50th percentile.

At the 90th percentile level, all surplus alternatives (except for the Flood Control Alternative) show annual flow volumes less than or equal to the flows under the baseline conditions. This is the result of more frequent surplus deliveries, which tend to lower Lake Mead reservoir levels. With lower reservoir levels, the frequency of flood control events (which contribute most of the flows at the 90th percentile level) is decreased, which in turn decreases the annual flow volume for a given percentile. The California and Shortage Protection alternatives exhibit the largest decreases, ranging from approximately 13 percent less than baseline conditions in 2006 to one percent less by 2023. Results for the Six States and Basin States alternatives are similar to each other, ranging from approximately six percent less than baseline conditions in 2013 to one percent less by 2023.

Figure 3.3-18
Colorado River Downstream of Havasu NWR Annual Flow Volume (af)
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values



In Figure 3.3-19, the cumulative distribution of annual flow volumes is shown for year 2006. This is the year of the largest differences at the 90th percentile level as shown in Figure 3.3-18. Although the annual flow volumes decrease for all surplus alternatives (except Flood Control Alternative) at a fixed percentile (i.e. at the 90th percentile) as compared to baseline, the range of annual flow volumes are the same for baseline conditions and the surplus alternatives. The frequency that a flow of a specific magnitude will occur, however, is lower under the surplus alternatives (except for the Flood Control Alternative) as shown in Figure 3.3-19.

Figures 3.3-20(a-d) present comparisons of the representative seasonal flows under baseline conditions and the surplus alternatives for 2016. For all seasons, the Flood Control Alternative is very similar to the baseline conditions. The Six States and Basin States alternatives tend to fall between the baseline conditions (and Flood Control Alternative) and the California (and Shortage Protection) alternatives.

As expected, the largest flows occur in the spring and summer seasons for baseline conditions and all alternatives due to downstream irrigation demands. For flows that are due primarily to flood control releases from Lake Mead (flows in the 90th – 100th percentile range), the range of mean monthly flows is not changed by the different surplus alternatives, since these magnitudes are dictated by the flood control regulations. These flows occur, however, less often for the surplus alternatives (except the Flood Control Alternative). This effect is less pronounced in July, when most flood control releases have ceased.

The differences in flows that are not due to flood control releases are greatest near the 70th percentile level. A numerical comparison of the 70th percentile values is shown in Table 3.3-13. The differences in mean monthly flows for the California Alternative compared to baseline conditions are approximately 16 percent in the winter, nine percent in the spring, six percent in the summer, and eight percent in the fall. For the Basin States alternative, the differences (compared to baseline conditions) in mean monthly flows are approximately three percent in the winter, one percent in the spring, and less than one percent in the summer and fall seasons.

Despite these differences, the flows for all alternatives fall well within the minimum and maximum flows for the baseline conditions, as well as within the current operational range for this reach.

Table 3.3-13
Comparison of Mean Monthly Flow (cfs) – Baseline Conditions and Surplus Alternatives
Colorado River Downstream of Havasu NWR (River Mile = 242.3)
70th Percentile Values for Year 2016

Season	Mean Monthly Flows (cfs) for Year 2016 at the 70th Percentile					
	Baseline	Basin States	Flood Control	Six States	California	Shortage Protection
Winter	8069	8347	7965	8317	9327	9223
Spring	15939	16166	15899	16072	17294	17144
Summer	15880	15957	15862	15953	16853	16644
Fall	11776	11805	11776	11686	12688	12531

Figure 3.3-19
Colorado River Annual Flow Volume Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

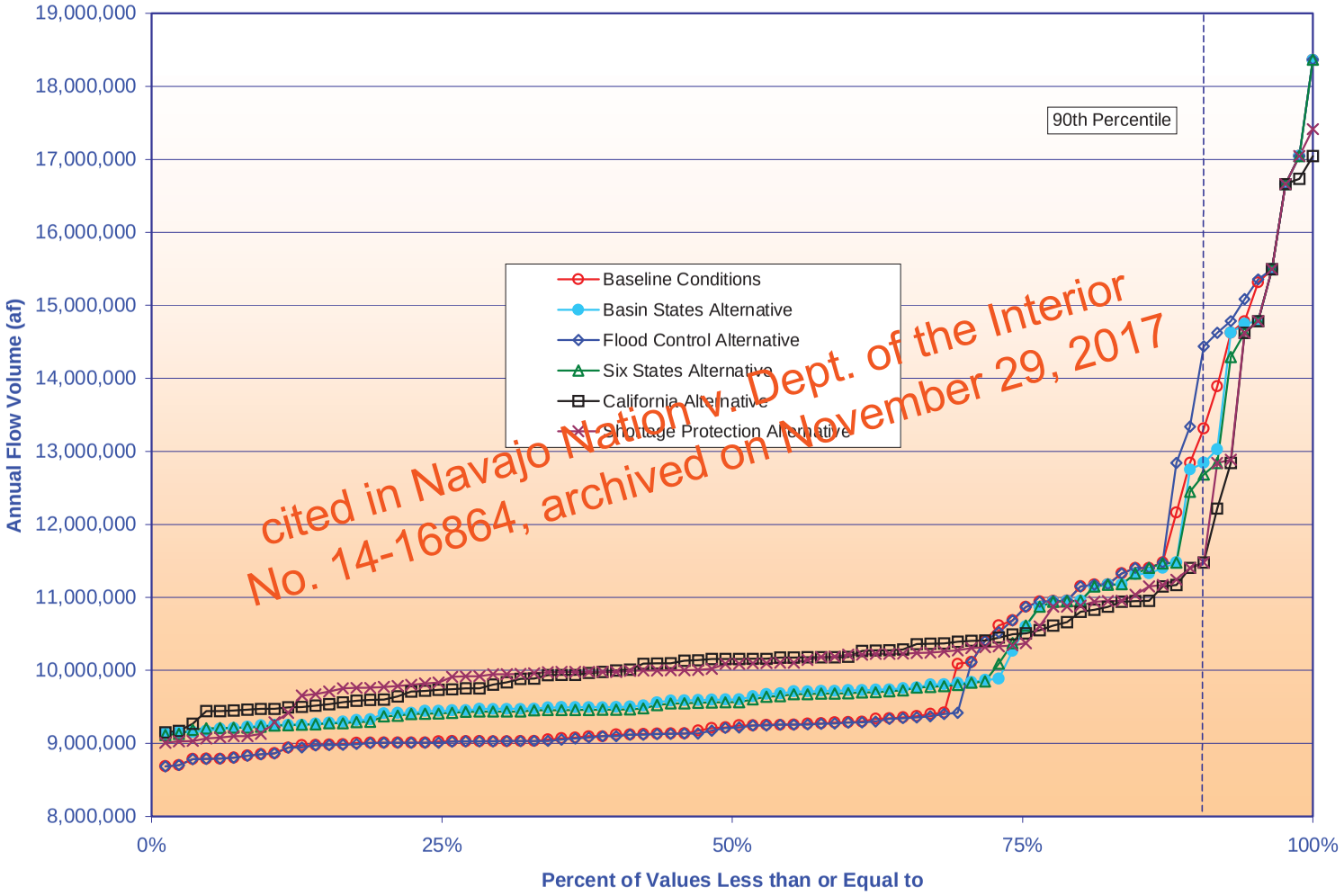


Figure 3.3-20a
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

Winter Season Flows
as Represented by January Flows

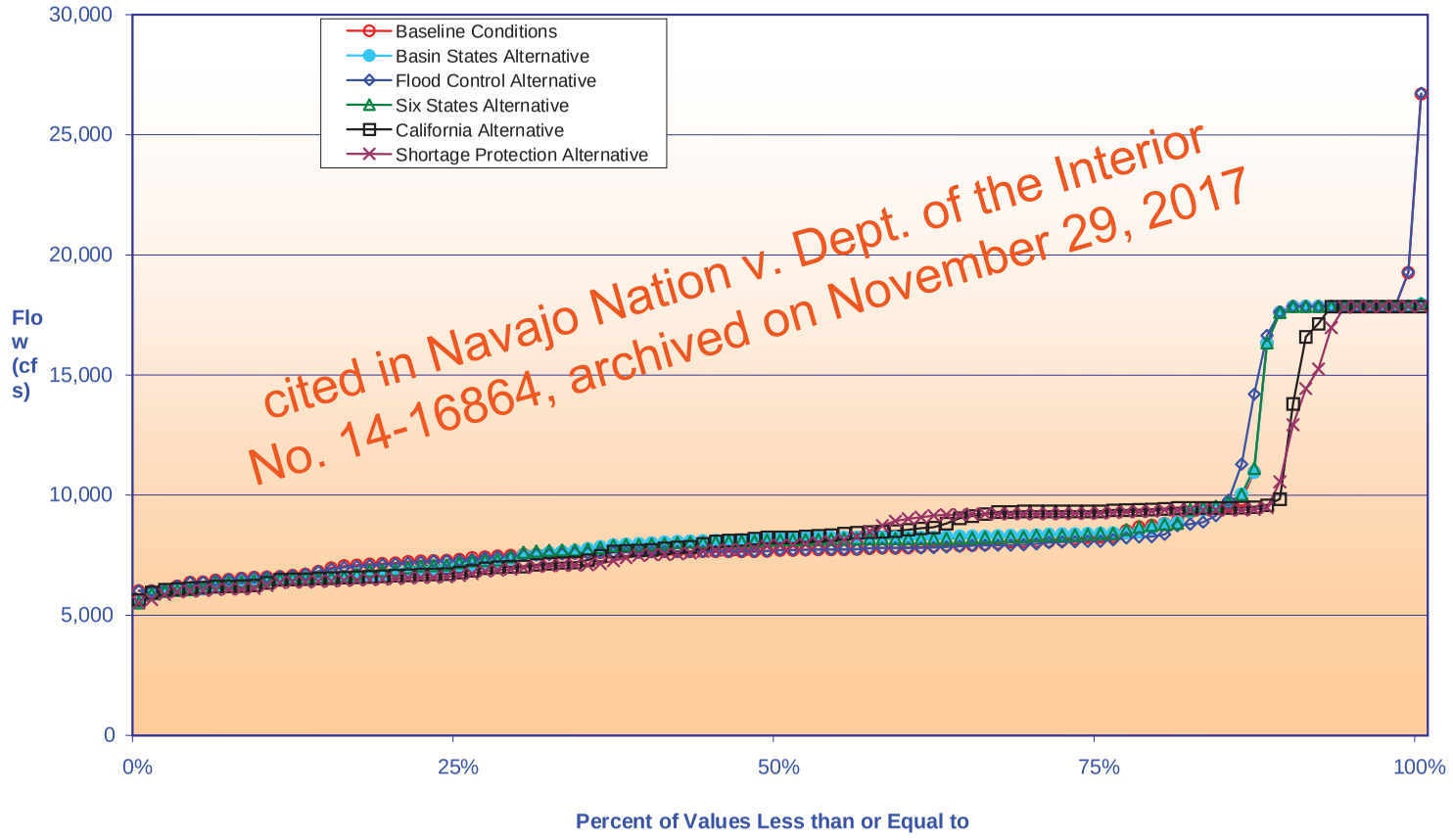


Figure 3.3-20b
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

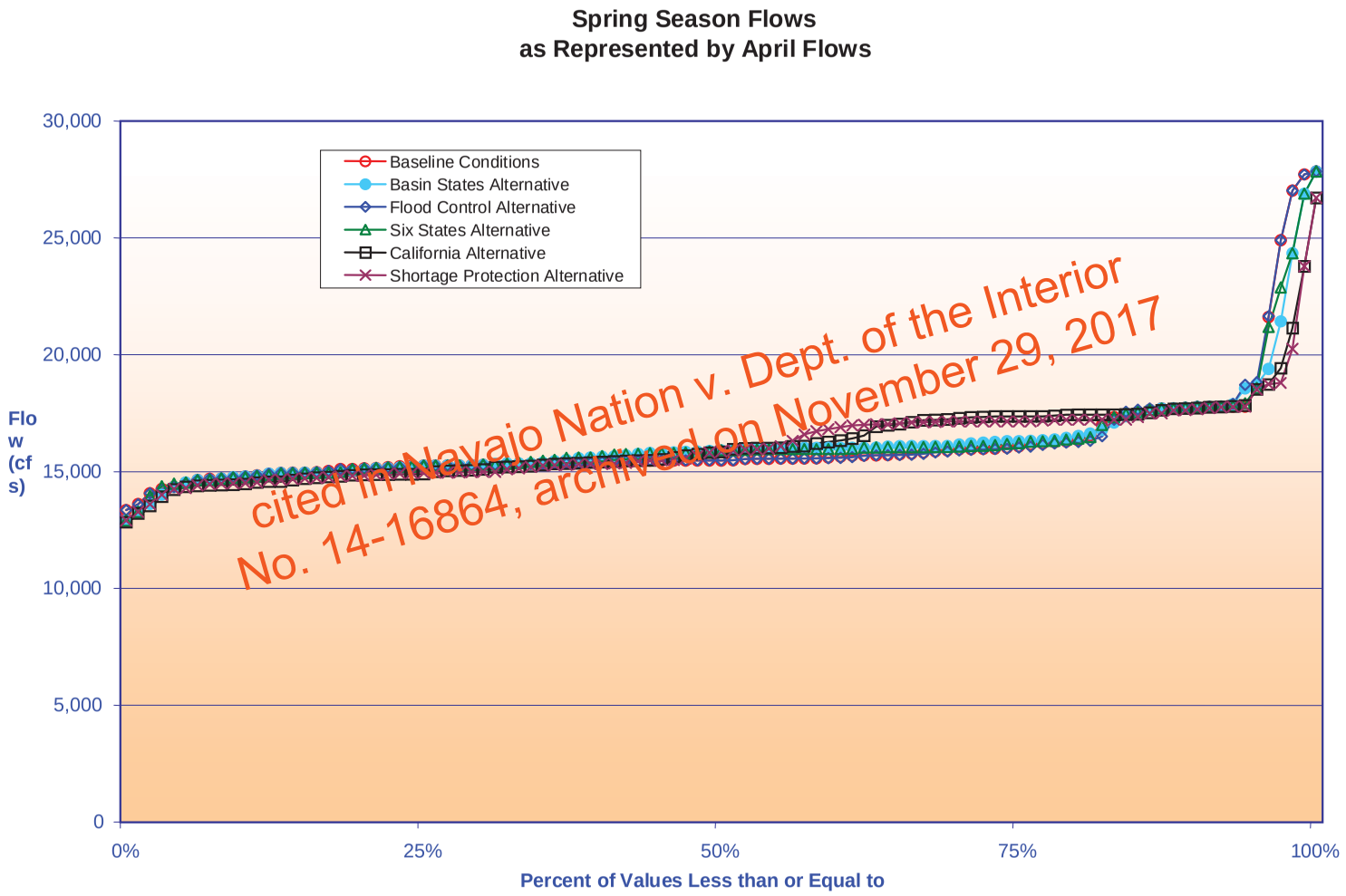


Figure 3.3-20c
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

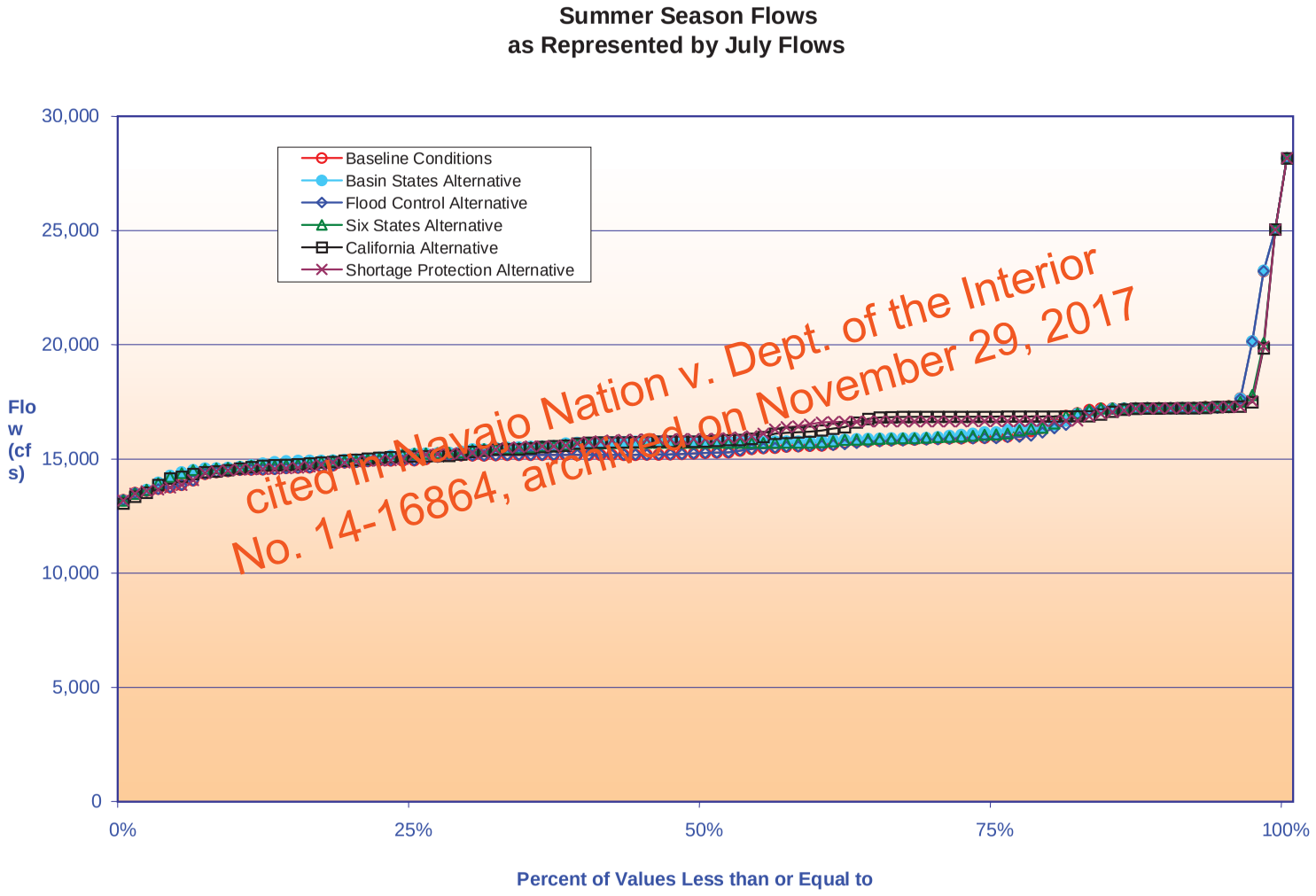
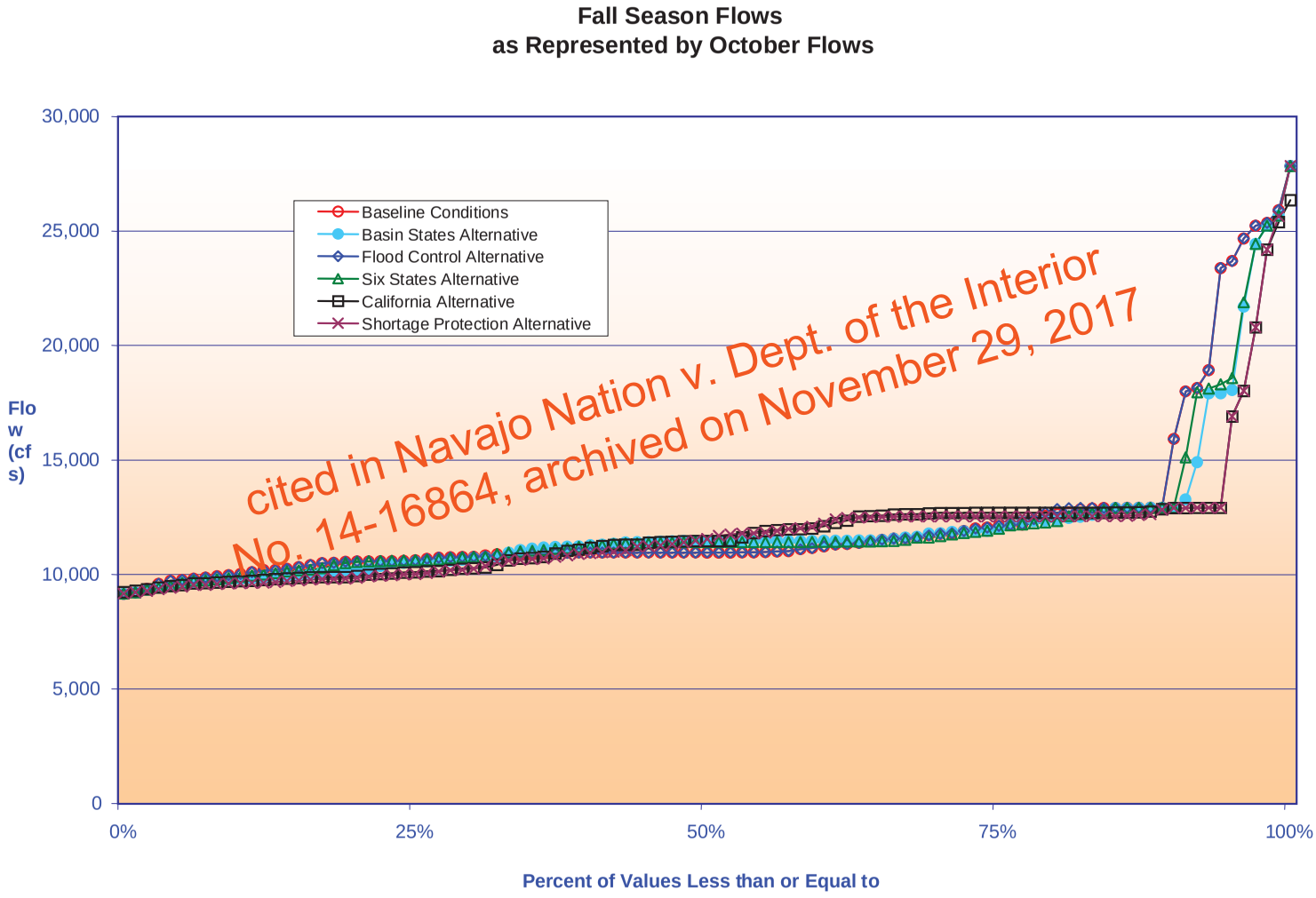


Figure 3.3-20d
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016



3.3.4.5.2 River Flows Between Parker Dam and Palo Verde Diversion

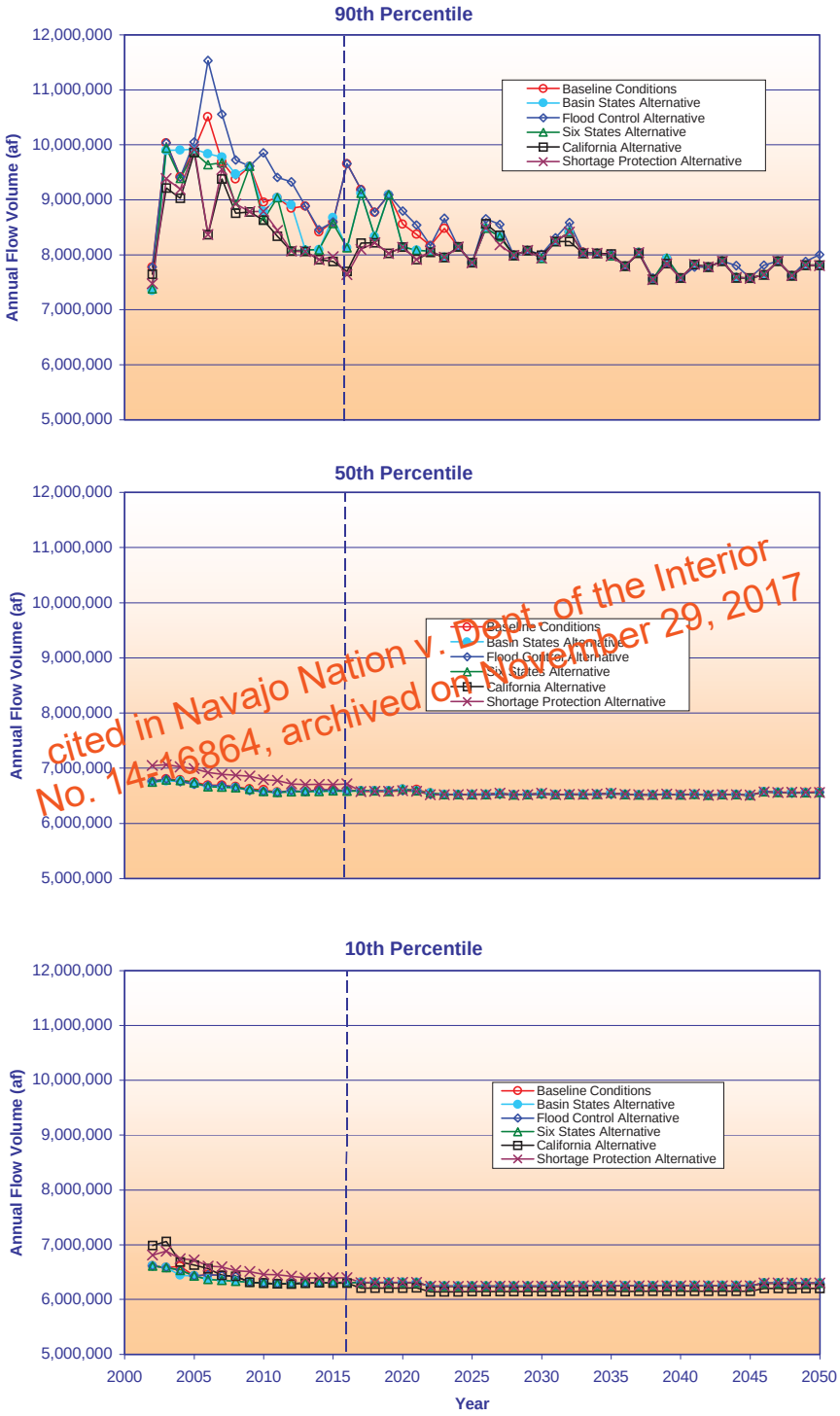
The point on the Colorado used to evaluate the river flows in the reach of the river located between Parker Dam and the Palo Verde Diversion Dam is located immediately upstream of the Colorado River Indian Reservation (CRIR) diversion. The CRIR diversion is located at Headgate Rock Dam, approximately 14 miles below Parker Dam. Flows in this reach of the river result from primarily from releases from Parker Dam (Lake Havasu).

Future flows in this reach would be affected by the proposed water transfers and exchanges between the California agricultural water agencies and MWD, which change the point of diversion. For example, under a potential transfer between IID and MWD (or SDCWA), the water that would normally be diverted at Imperial Dam would now be diverted above Parker Dam. As discussed in Section 3.3.3.2, the proposed California intrastate transfers are included in the simulation of the baseline conditions and surplus alternatives. Although the transfers themselves are not a direct result of the proposed interim surplus criteria, the transfers were modeled because they are expected to be a component of the future Lower Basin water supply management programs and to maintain consistency for comparison of the alternatives to baseline conditions. The intrastate transfers proposed by California and any potential environmental effects that would occur as a result of those actions are addressed by separate NEPA and other environmental compliance.

The 90th, 50th, and 10th percentile annual flow volumes for this reach are shown in Figure 3.3-21. As shown by the 50th percentile values, annual flow volumes in this reach can be expected to be greater for the California and Shortage Protection alternatives than for the baseline conditions and other alternatives during the 15-year interim surplus criteria period. This is the result of more frequent surplus deliveries under those two alternatives. Increases from baseline conditions under the California Alternative range from approximately seven percent in the first year down to one percent by 2013. A 1.5 percent decrease from baseline conditions is seen for the period 2017 through 2050 as a result of the modeled transfer of 100 kaf from PVID to MWD as part of the California Alternative. Increases from baseline conditions under the Shortage Protection Alternative range from approximately four percent in the first year down to two percent by 2016. The annual flow volumes for the Flood Control, Six States, and Basin States alternatives are essentially the same (less than one percent) as those under the baseline conditions for the entire period of analysis (2002 through 2050).

Similar results are seen at the 10th percentile level. Increases from baseline conditions under the California Alternative range from approximately six percent in the first year down to two percent by 2006. A 1.6 percent decrease from baseline conditions is seen for the period 2017 through 2050 as a result of the modeled transfer of 100 kaf from PVID to MWD as part of the California Alternative. Increases from baseline conditions under the Shortage Protection Alternative range from approximately three percent in the

Figure 3.3-21
Colorado River Upstream of CRIR Diversion Annual Flow Volume (af)
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

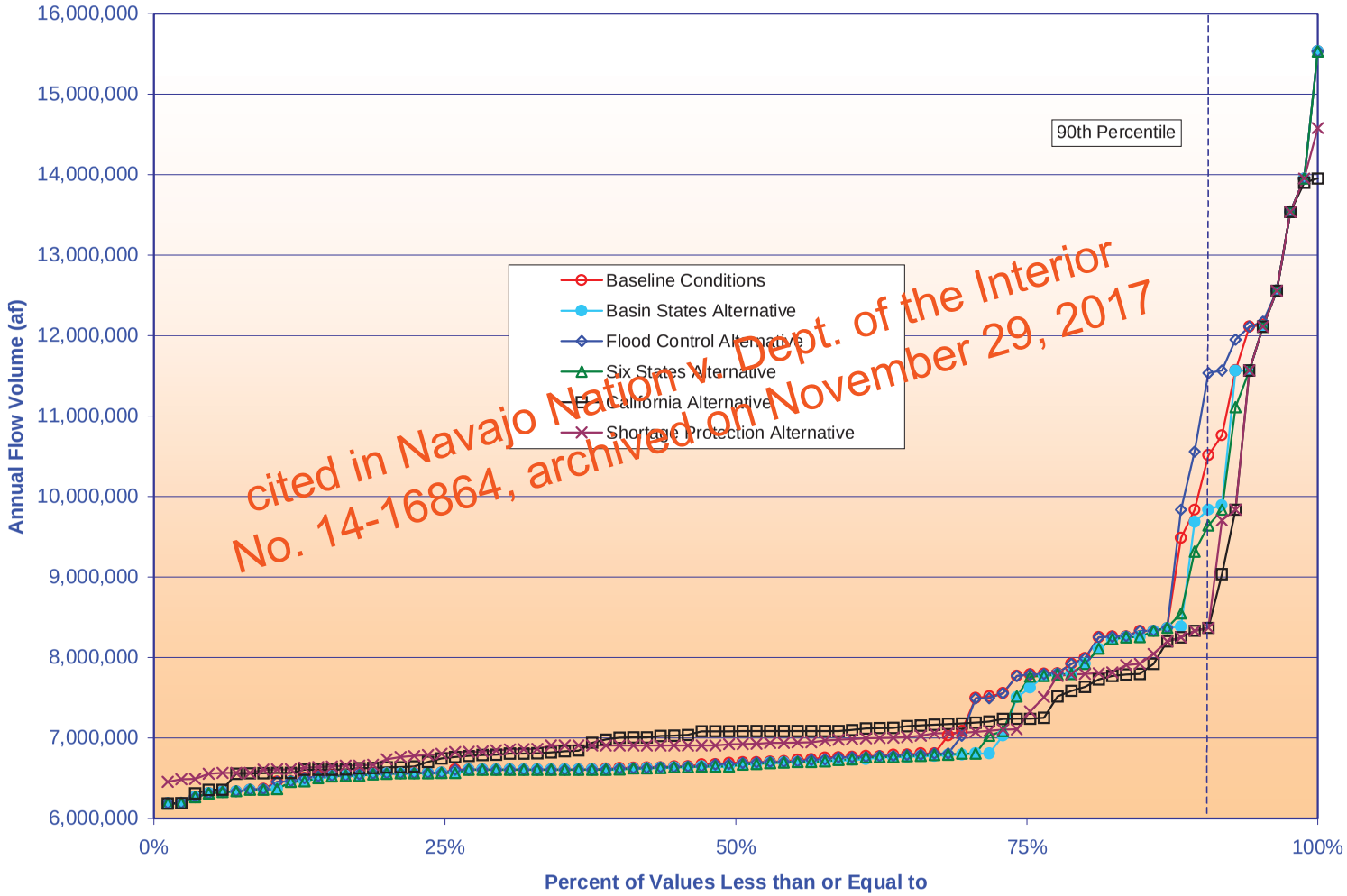


first year down to one percent by 2016. The annual flow volumes for the Flood Control, Six States, and Basin States alternatives are essentially the same (less than one percent) as those under the baseline conditions for the entire period of analysis (2002 through 2050).

At the 90th percentile level, all surplus alternatives (except for the Flood Control Alternative) show annual flow volumes less than or equal to the flows under the baseline conditions. This is the result of more frequent surplus deliveries, which tend to lower Lake Mead reservoir levels. With lower reservoir levels, the frequency of flood control events (which contribute most of the flows at the 90th percentile level) is decreased, which in turn decreases the annual flow volume for a given percentile. The California and Shortage Protection alternatives exhibit the largest decreases, ranging from two to 20 percent less than baseline conditions from 2002 through 2023, with the largest differences in 2006 and 2016. The Six States and Basin States alternatives exhibit similar behavior, ranging from two to 16 percent less than baseline conditions from 2002 through 2023, with the largest differences in 2016.

In Figure 3.3-22, the cumulative distribution of annual flow volumes is shown for year 2006. This is the year of the largest differences at the 90th percentile level as shown in Figure 3.3-21. Although the annual flow volumes decrease for all surplus alternatives (except Flood Control Alternative) at a fixed percentile (i.e. at the 90th percentile) as compared to baseline, the range of annual flow volumes are the same for baseline conditions and the surplus alternatives. The frequency that a flow of a specific magnitude will occur, however, is lower under the surplus alternatives (except for the Flood Control Alternative) as shown in Figure 3.3-22.

Figure 3.3-22
Colorado River Annual Flow Volumes Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2006



Figures 3.3-23 (a-d) present comparisons of the representative seasonal flows under baseline conditions and the surplus alternatives for 2016. As expected, the largest flows occur in the spring and summer seasons for baseline conditions and all alternatives due to downstream irrigation demands. For flows that are due primarily to flood control releases from Lake Mead (flows in the 90th – 100th percentile range), the range of mean monthly flows is not changed by the different surplus alternatives, since these magnitudes are dictated by the flood control regulations. These flows occur, however, less often for the surplus alternatives (except the Flood Control Alternative). This effect is less pronounced in July, when most flood control releases have ceased.

The differences in flows that are not due to flood control releases are similar for all alternatives and baseline conditions. A numerical comparison of the 70th percentile values is shown in Table 3.3-14. The differences in mean monthly flows for the California Alternative compared to baseline conditions are approximately six percent in the winter, three percent in the spring, one percent in the summer, and less than one percent in the fall. For the Basin States alternative, the differences (compared to baseline conditions) in mean monthly flows are less than one percent for all seasons.

Table 3.3-14
Comparison of Mean Monthly Flow (cfs) – Baseline Conditions and Surplus Alternatives
Colorado River Upstream of CRIR Diversion (River Mile = 180.8)
70th Percentile Values for Year 2016

Season	Mean Monthly Flows (cfs) for Year 2016 at the 70th Percentile					
	Baseline	Basin States	Flood Control	Six States	California	Shortage Protection
Winter	3897	3895	3880	3897	4117	4012
Spring	11690	11690	11690	11690	12009	11793
Summer	13025	12990	12989	13025	13194	12984
Fall	8005	7934	8064	8005	7987	7895

Figure 3.3-23a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

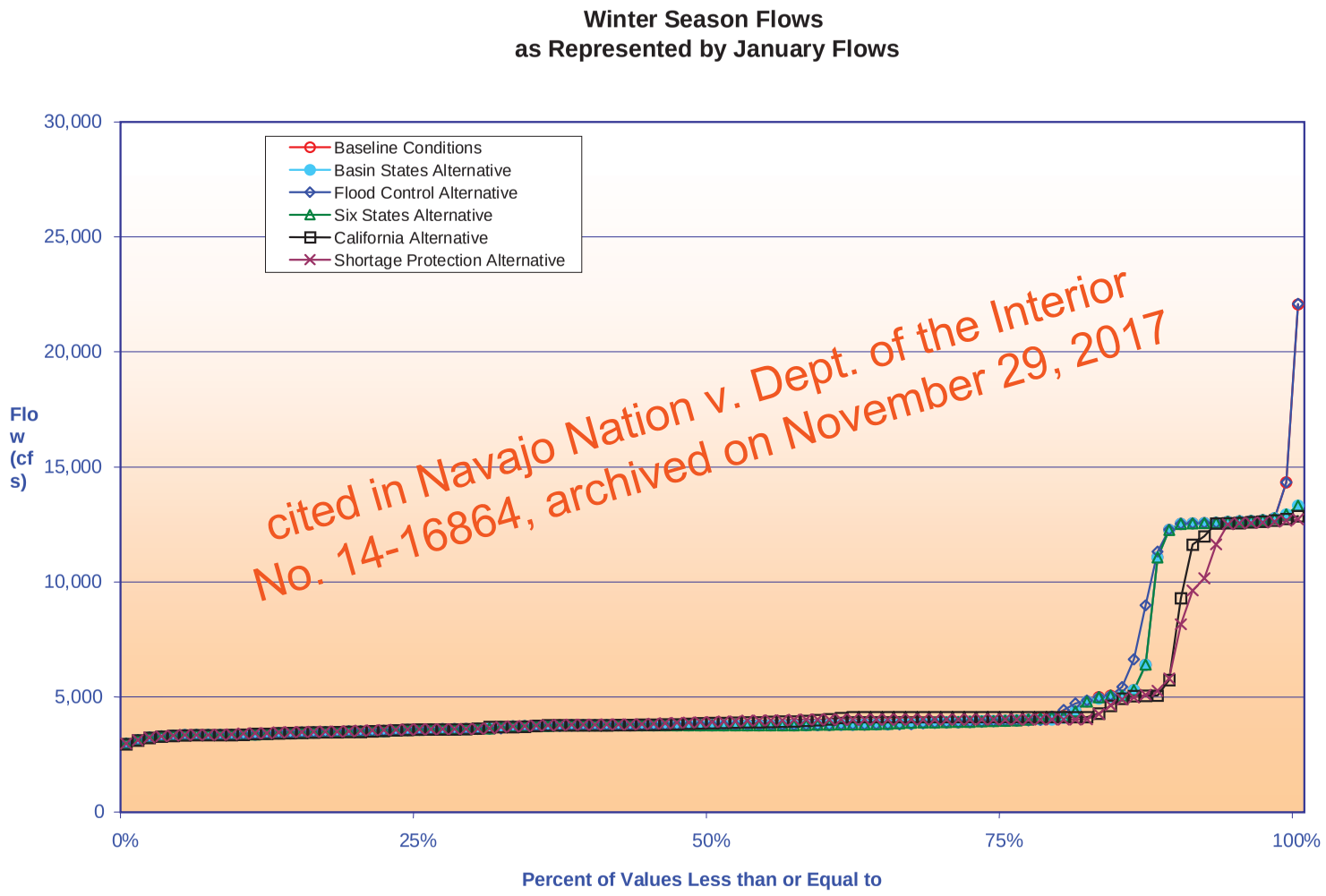


Figure 3.3-23b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

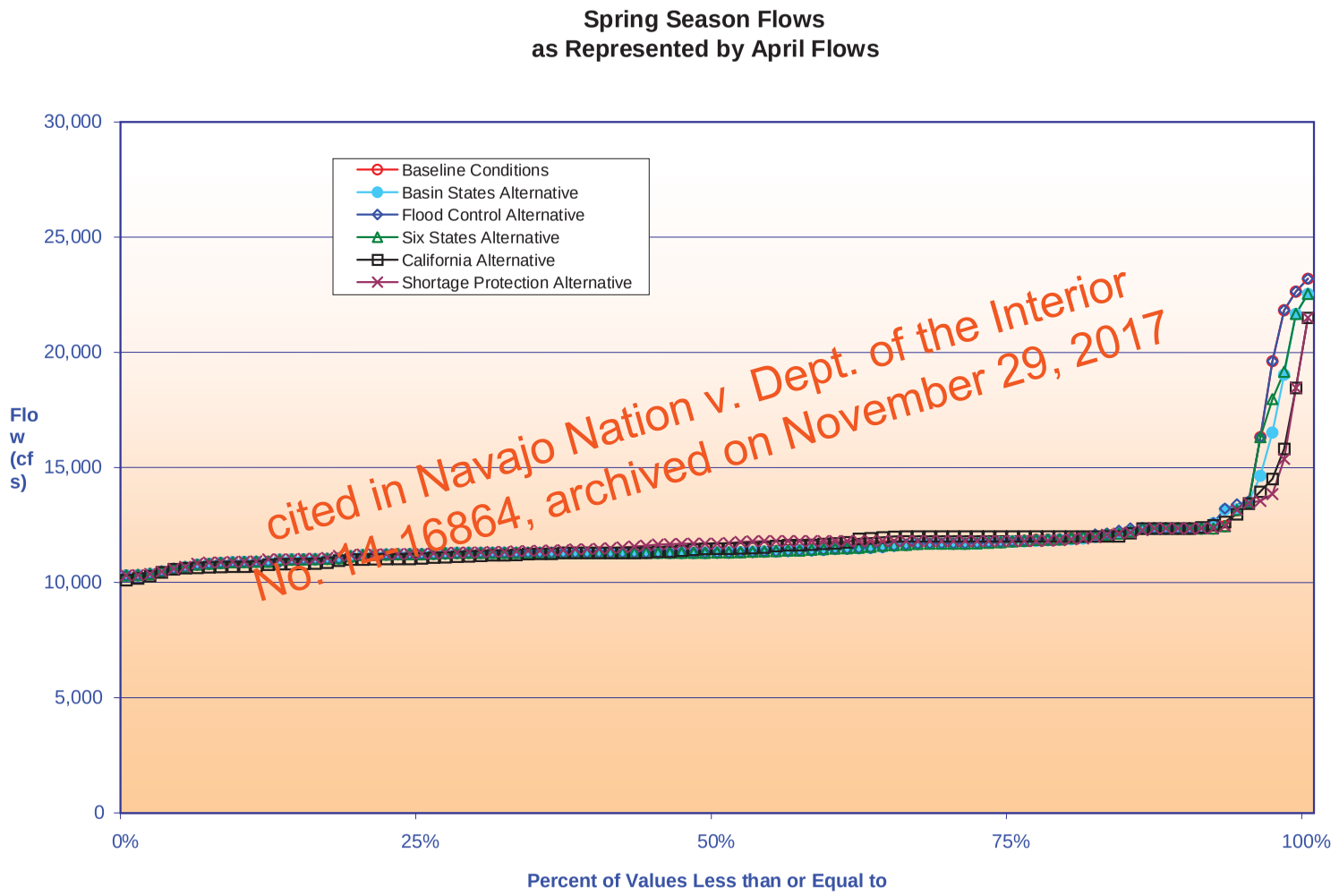


Figure 3.3-23c
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

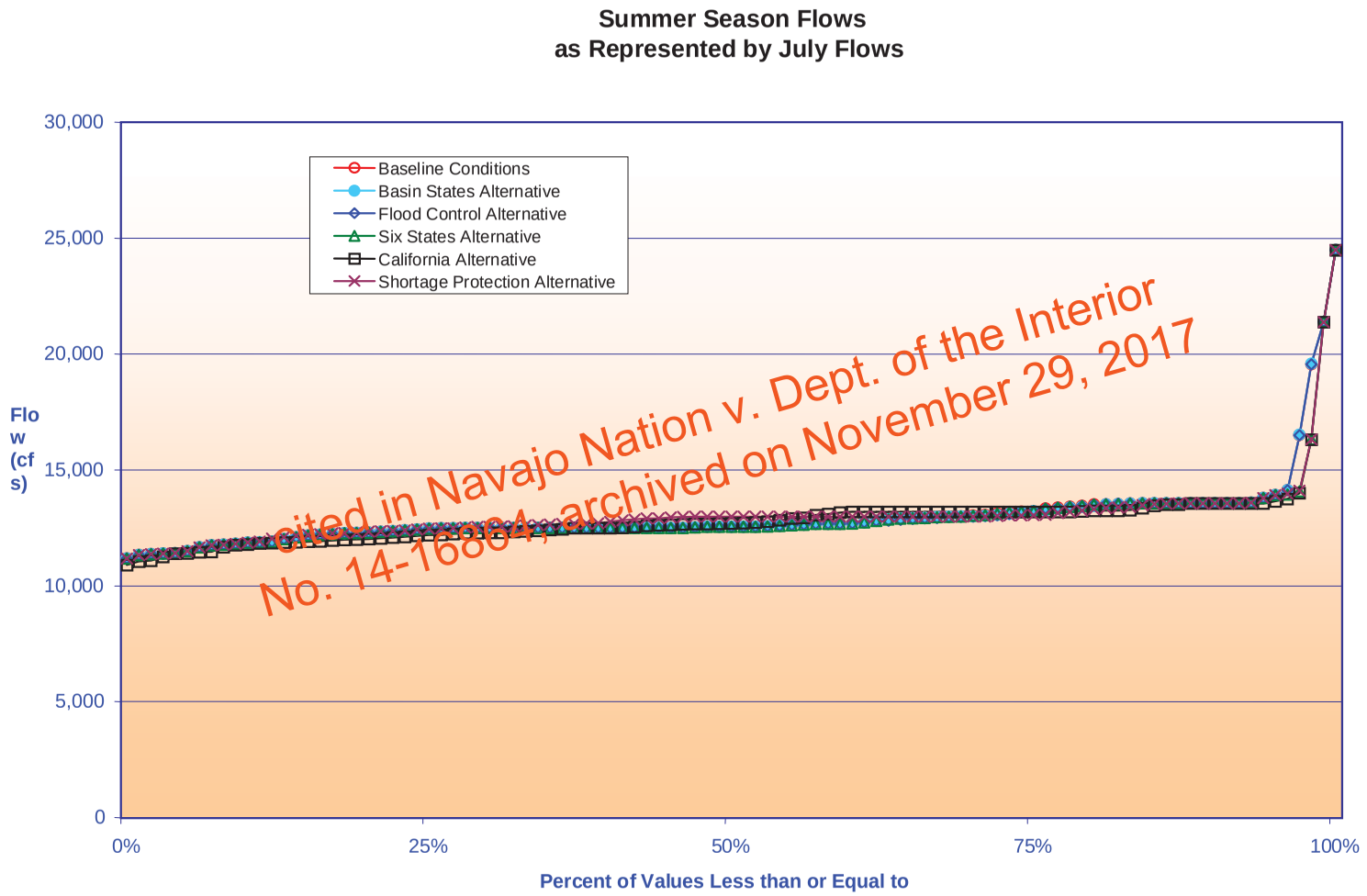
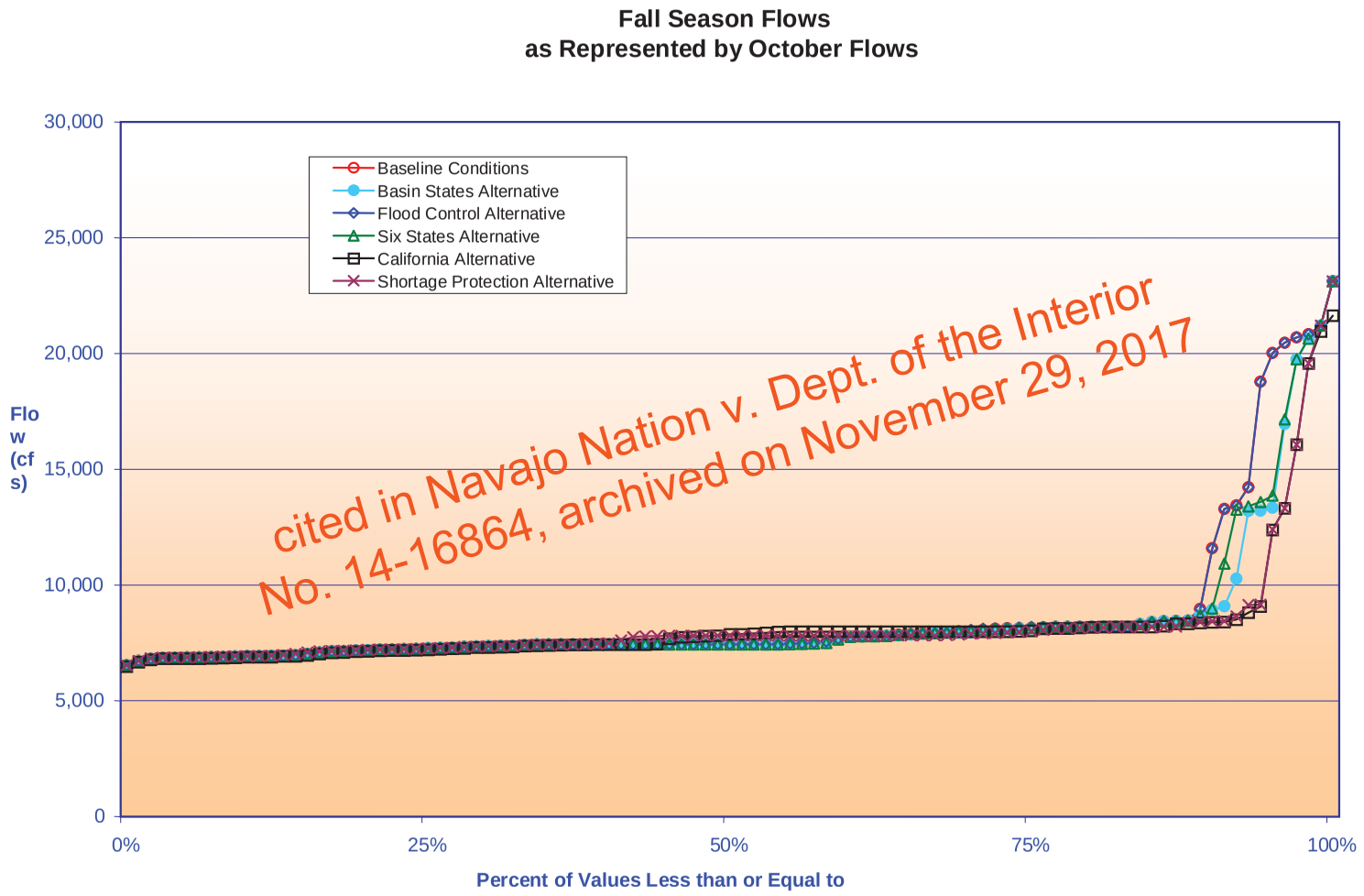


Figure 3.3-23d
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016



3.3.4.5.3 River Flows Between Palo Verde Diversion Dam and Imperial Dam

The flow of the Colorado River between Palo Verde Diversion Dam and Imperial Dam is normally set at the amount needed to meet the United States diversion requirements downstream of the Palo Verde Diversion plus deliveries to Mexico. The river location that was modeled for this reach of the river is located immediately downstream of the Palo Verde Diversion Dam.

As discussed in Section 3.3.4.5.2, the proposed California water interstate transfers are included in the simulation of the baseline conditions and surplus alternatives.

The 90th, 50th, and 10th percentile annual flow volumes for this reach are shown in Figure 3.3-24. As shown by the 50th percentile values, annual flow volumes in this reach can be expected to be greater for the California and Shortage Protection alternatives than for the baseline conditions for the first few years of the 15-year interim surplus criteria period. This is a result of more frequent surplus deliveries. The largest increases from baseline conditions occur under the California Alternative and are approximately eight percent during the years 2002 through 2007. After 2007, the annual flow volumes are identical to the baseline conditions. Annual flow volumes under the Shortage Protection Alternative are approximately five percent during the years 2002 through 2011. After 2011, the annual flow volumes are identical to the baseline conditions. Results for the Flood Control, Six States, and Basin States alternatives are identical to those under the baseline conditions for the entire period (2002 through 2050).

At the 10th percentile level, the California Alternative has the same relative difference (eight percent) for the years 2002 and 2003, while the Shortage Protection Alternative exhibits the same relative difference (five percent) for the years 2002 through 2005. All other results are identical to those observed for the 50th percentile values.

At the 90th percentile level, all surplus alternatives (except for the Flood Control Alternative) show annual flow volumes less than or equal to the flows under the baseline conditions. This is the result of more frequent surplus deliveries, which tend to lower Lake Mead reservoir levels. With lower reservoir levels, the frequency of flood control events (which contribute most of the flows at the 90th percentile level) is decreased, which in turn decreases the annual flow volume for a given percentile. The California and Shortage Protection alternatives exhibit the largest decreases, ranging from approximately 17 percent less than baseline conditions in 2006 to four percent less by 2023. Results for the Six States and Basin States alternatives are similar to each other, ranging from approximately 11 percent less than baseline conditions in 2016 to four percent less by 2023.

In Figure 3.3-25, the cumulative distribution of annual flow volumes is shown for year 2006. This is the year of the largest differences at the 90th percentile level as shown in Figure 3.3-24. Although the annual flow volumes decrease for all surplus alternatives (except Flood Control Alternative) at a fixed percentile (i.e. at the 90th percentile) as compared to baseline, the range of annual flow volumes are the same for baseline conditions and the surplus alternatives. The frequency that a flow of a specific magnitude will occur, however, is lower under the surplus alternatives (except for the Flood Control Alternative) as shown in Figure 3.3-25.

Figures 3.3-26 (a-d) present comparisons of the representative seasonal flows under baseline conditions and the surplus alternatives for 2016. As expected, the largest flows occur in the spring and summer seasons for baseline conditions and all alternatives due to downstream irrigation demands. For flows that are due primarily to flood control releases from Lake Mead (flows in the 90th – 100th percentile range), the range of mean monthly flows is not changed by the different surplus alternatives, since these magnitudes are dictated by the flood control regulations. These flows occur, however, less often for the surplus alternatives (except the Flood Control Alternative). This effect is less pronounced in July, when most flood control releases have ceased.

The differences in flows not due to flood control releases are similar for all alternatives and baseline conditions. A numerical comparison are the 70th percentile values is shown in Table 3.3-15. The differences in mean monthly flows for the California Alternative compared to baseline conditions are approximately 10 percent in the winter, seven percent in the spring, six percent in the summer, and eight percent in the fall. For the Basin States Alternative, the mean monthly flows are identical to those under baseline conditions for all seasons.

Table 3.3-15
Comparison of Mean Monthly Flow (cfs) – Baseline Conditions and Surplus Alternatives
Colorado River Downstream of Palo Verde Diversion Dam (River Mile = 133.8)
70th Percentile Values for Year 2016

Season	Mean Monthly Flows (cfs) for Year 2016 at the 70th Percentile					
	Baseline	Basin States	Flood Control	Six States	California	Shortage Protection
Winter	3516	3516	3516	3516	3865	3760
Spring	9888	9888	9888	9888	10608	10392
Summer	10729	10729	10729	10729	11426	11217
Fall	7191	7191	7191	7191	7749	7582

Figure 3.3-24
Colorado River Downstream Palo Verde Diversion Dam Annual Flow Volume (af)
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

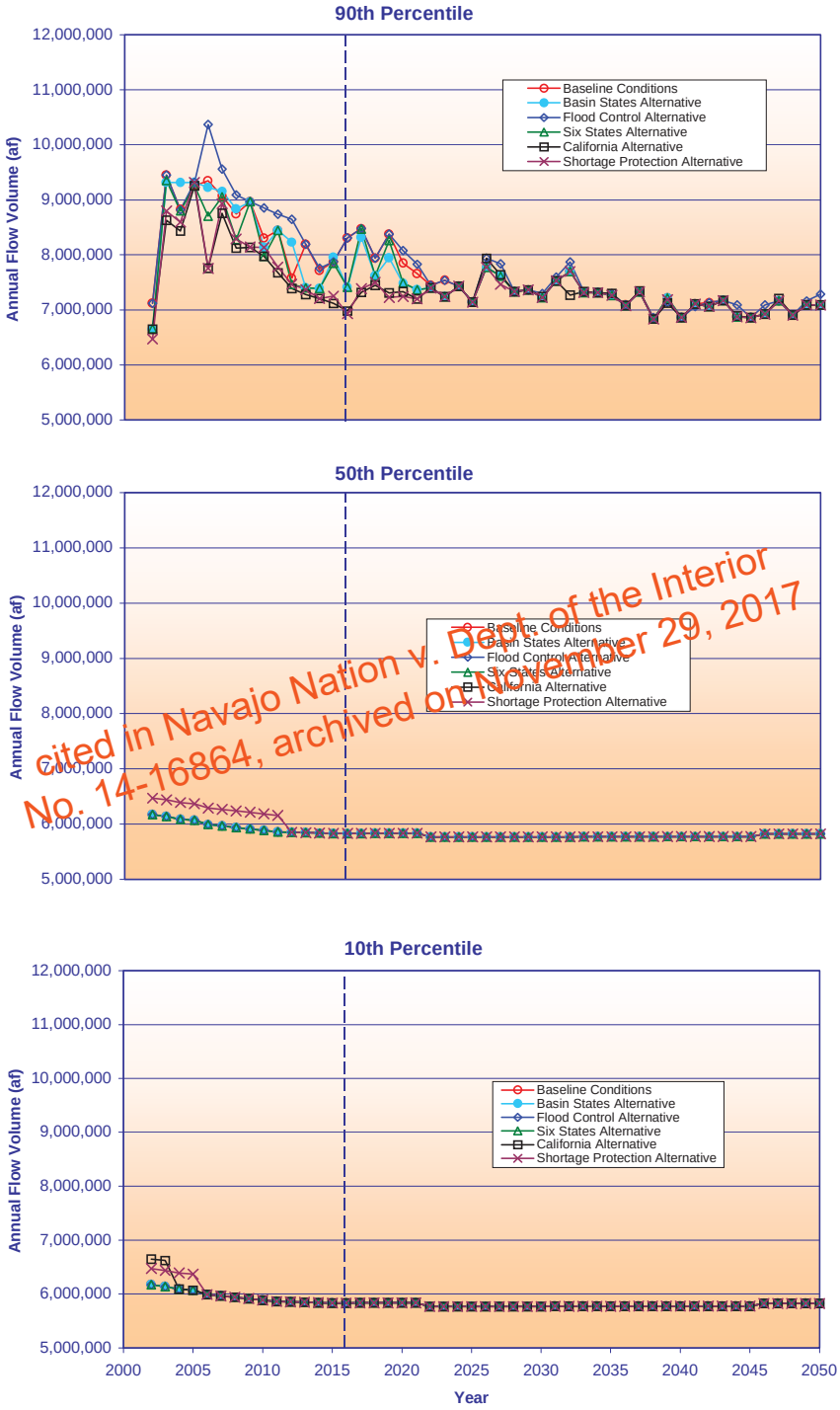


Figure 3.3-25
Colorado River Annual Flow Volumes Downstream of Palo Verde Irrigation Diversion
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2006

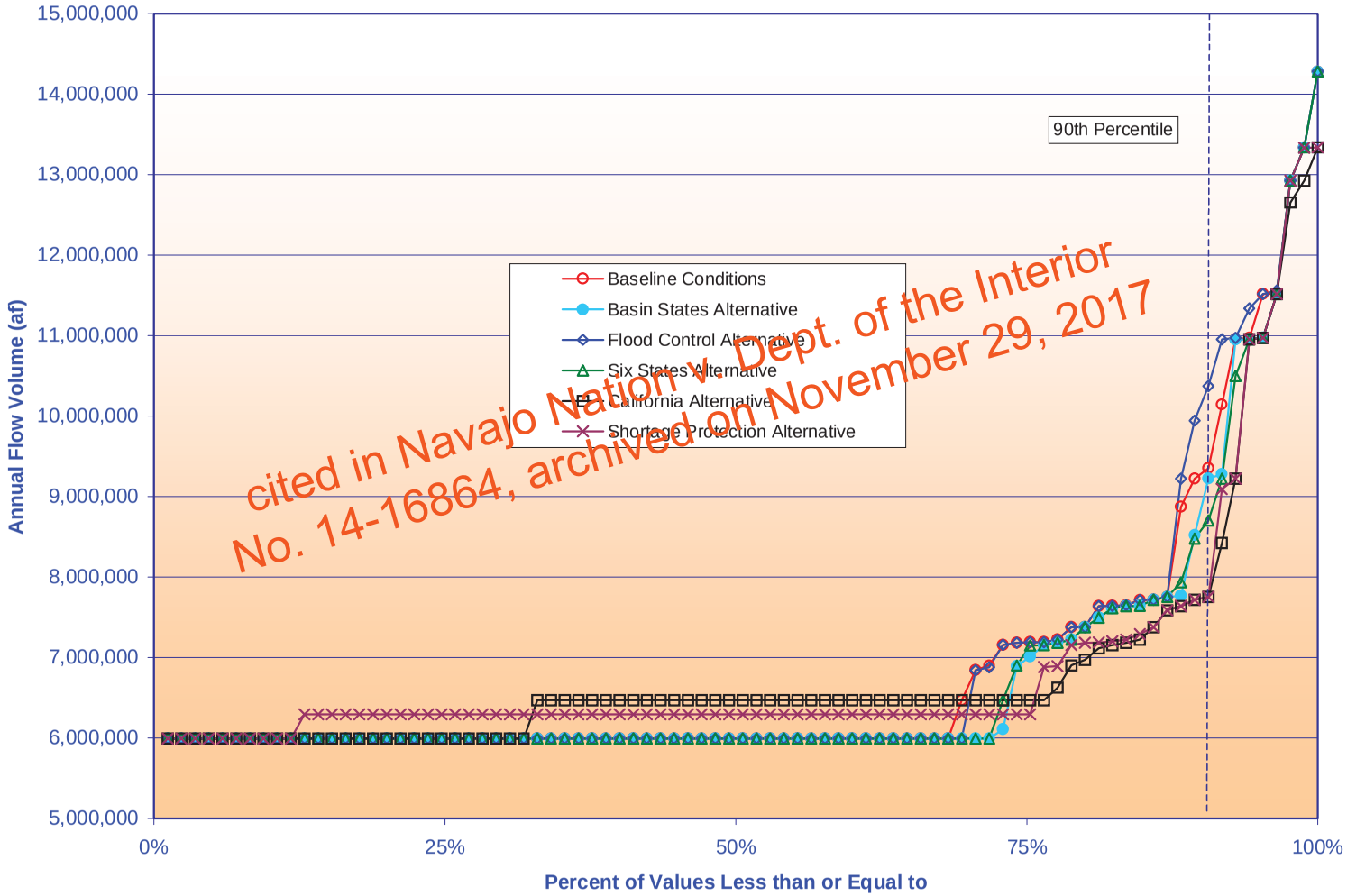


Figure 3.3-26a
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Division
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

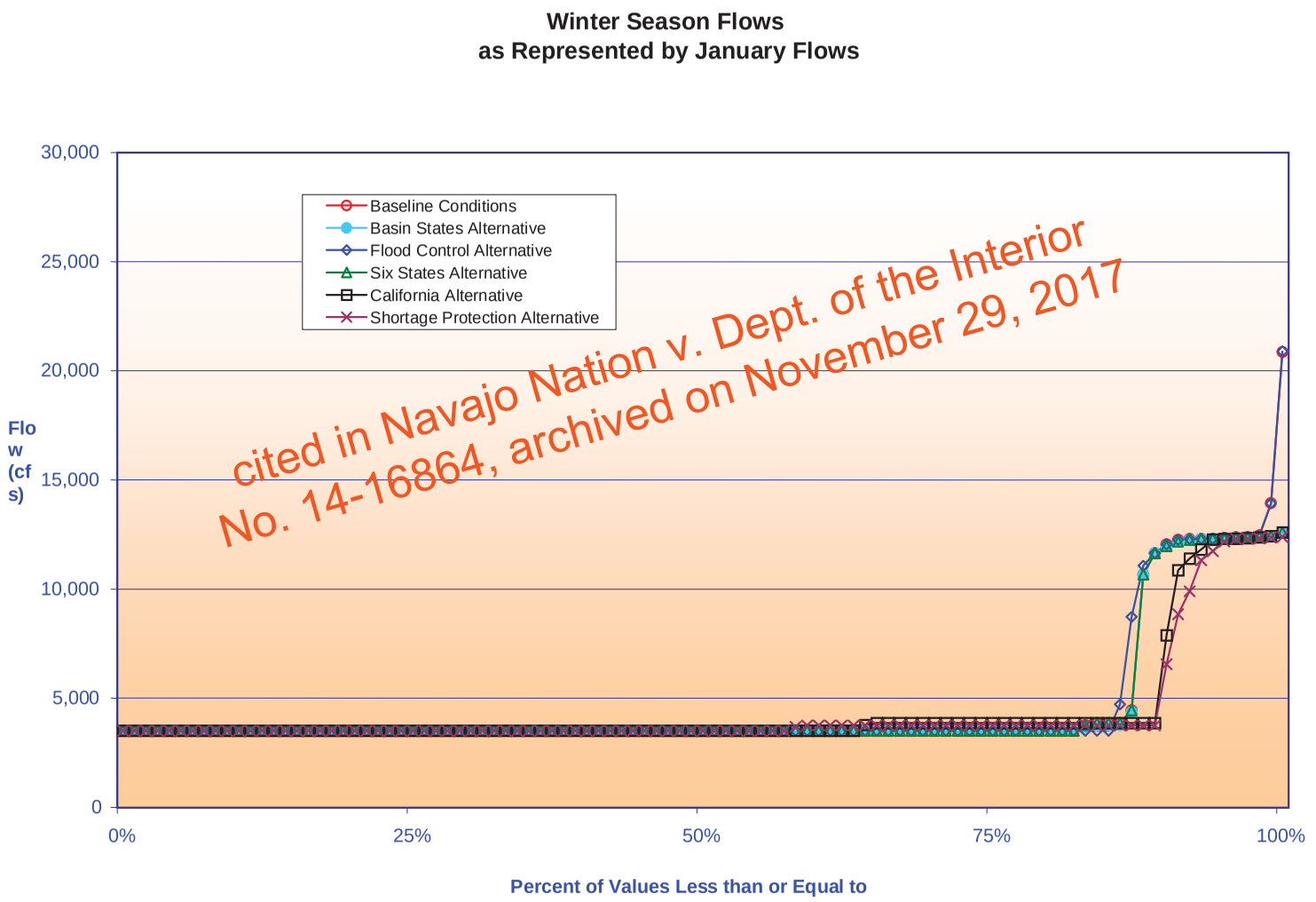


Figure 3.3-26b
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Division
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

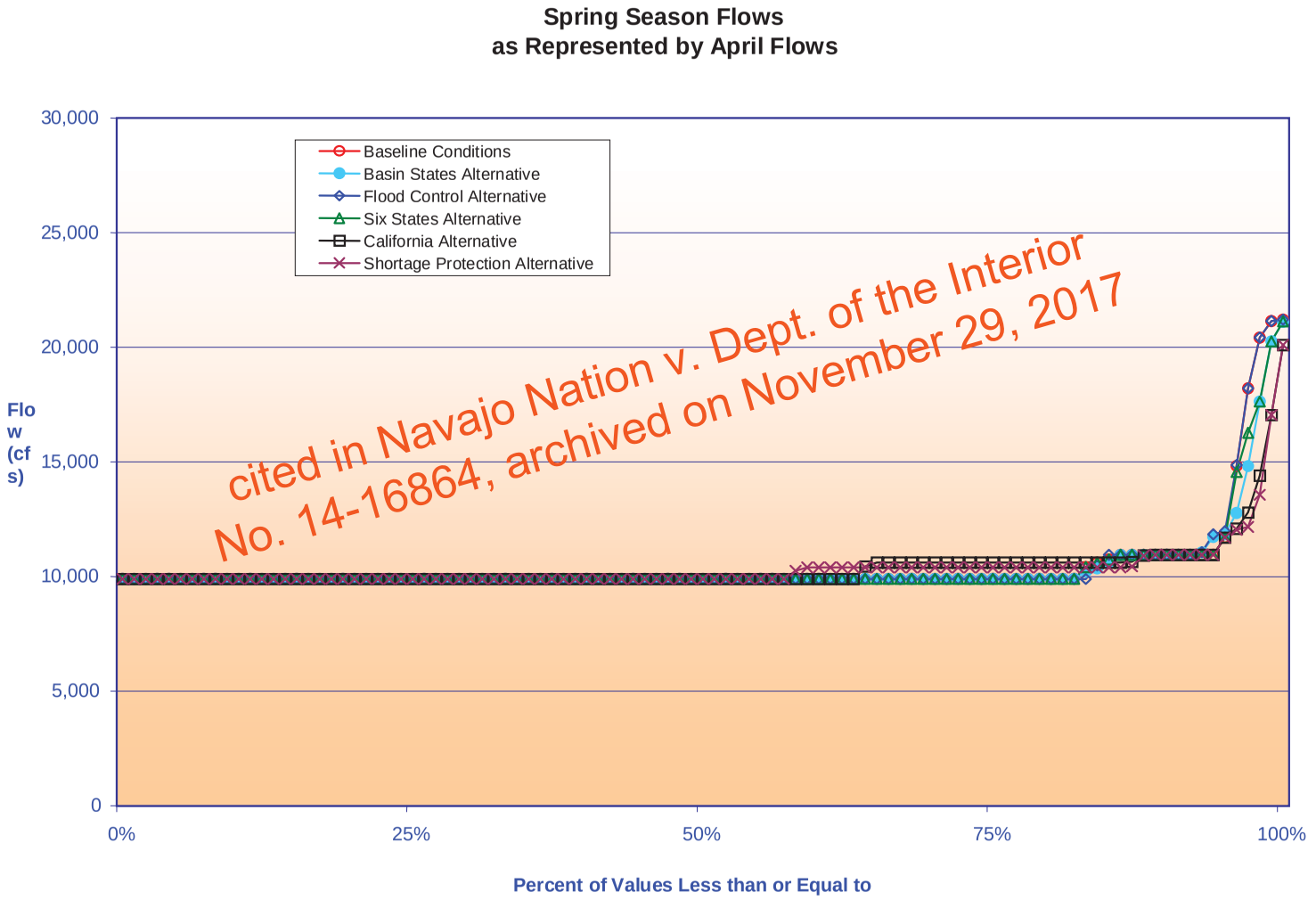


Figure 3.3-26c
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Division
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

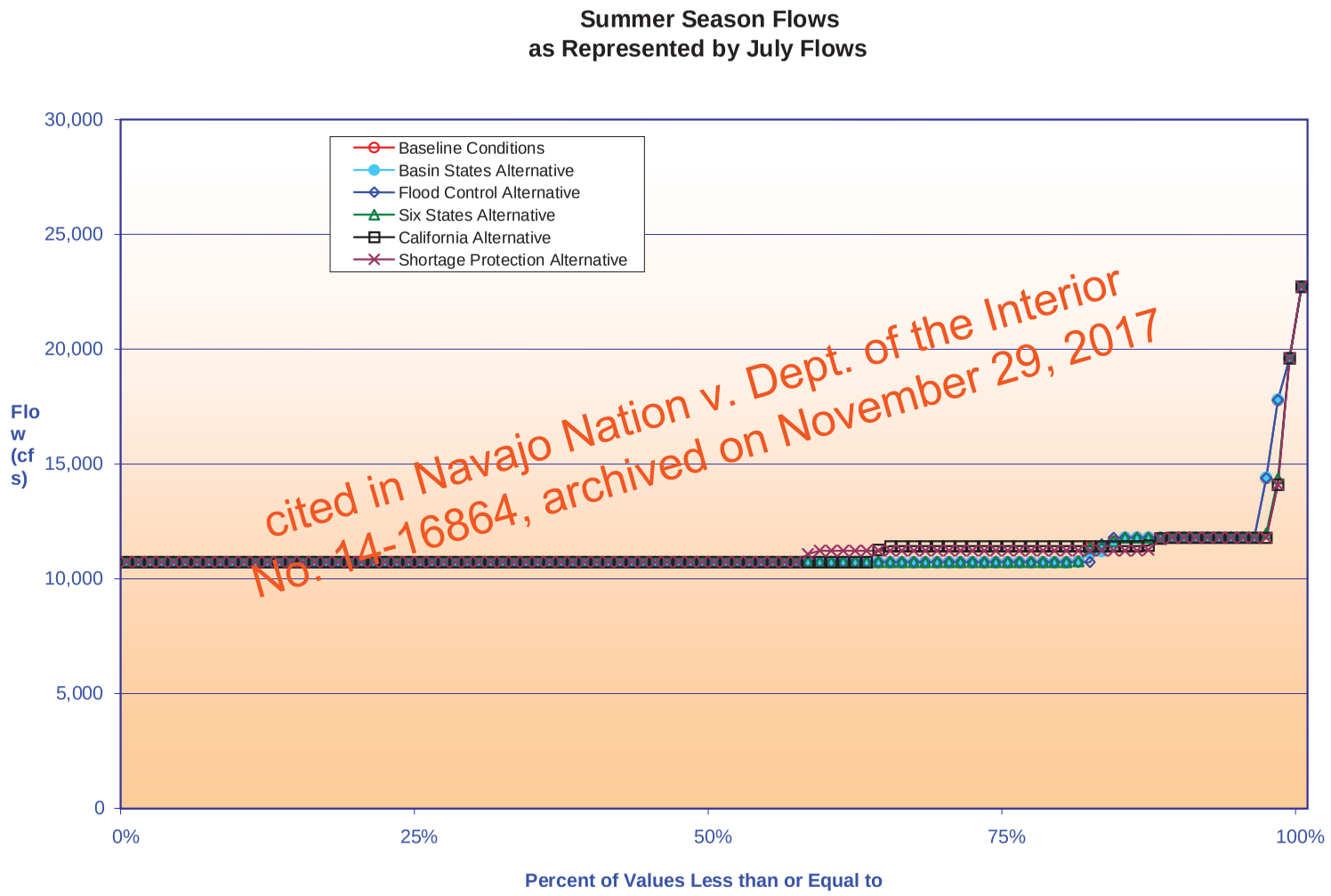
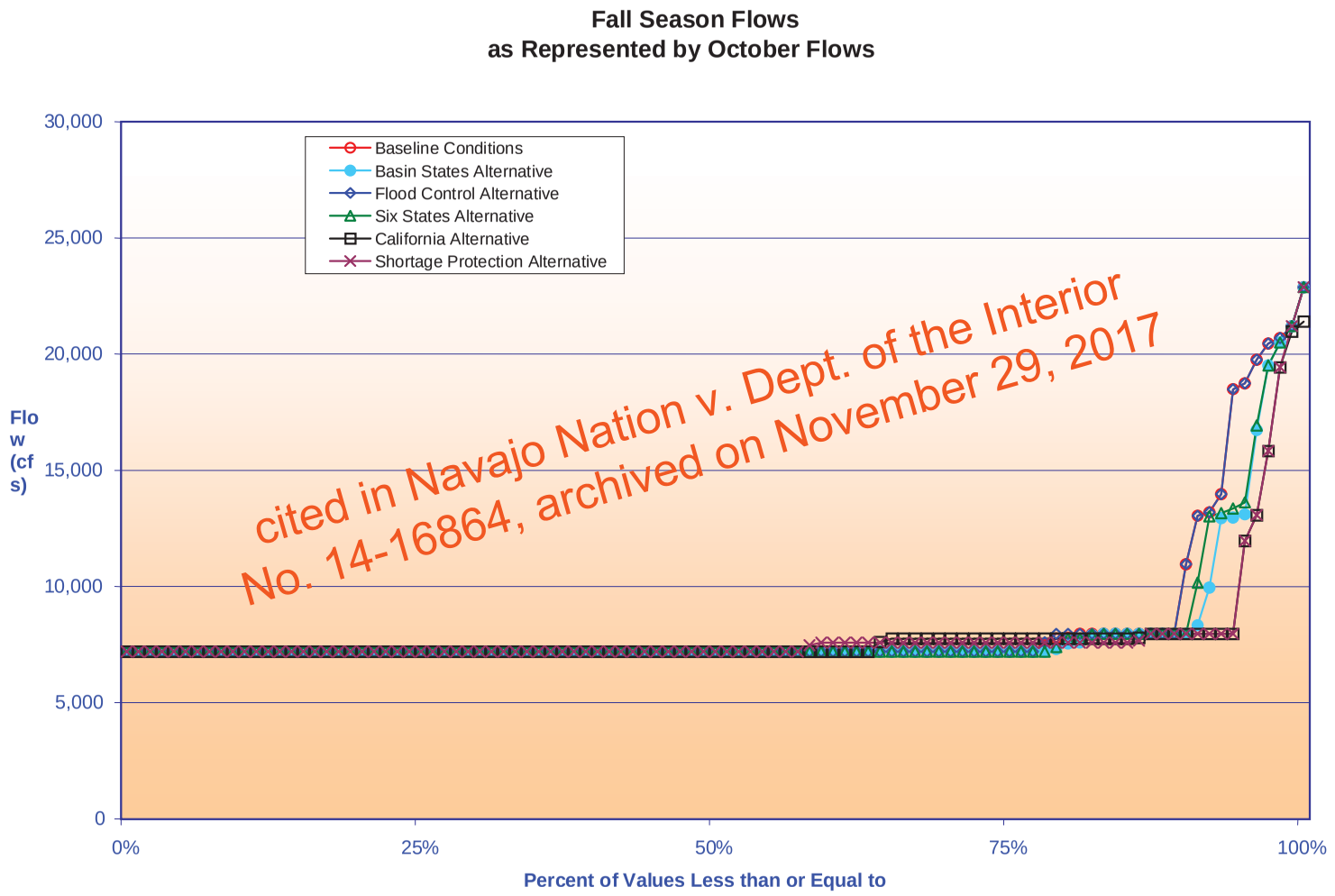


Figure 3.3-26d
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Division
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016



3.3.4.5.4 River Flows Between Imperial Dam and Morelos Dam

The flows in the Colorado River below Imperial Dam are primarily comprised of the water delivered to Mexico in accordance with the Treaty. Mexico's principal diversion is at Morelos Dam, which is located, approximately nine miles southwest of Yuma, Arizona. Mexico owns, operates, and maintains Morelos Dam.

The reach of river between Morelos Dam and the SIB is commonly referred to by Reclamation as the Limitrophe Division. Reclamation's authority in this division is limited to maintaining the bankline road, the levee, various drains to the river, and the U.S. Bypass drain that carries agricultural drainage water to the Cienega de Santa Clara in Mexico. Under International Treaty the United States Section of the IBWC is obligated to maintain the river channel within this division. Reclamation provides assistance to the IBWC, when requested, for maintenance needs in this reach of the river.

Minute 242 (Minutes are defined as decisions of IBWC and signed by the Mexican and United States commissioners) of IBWC and the Mexican Water Treaty of 1944 provide requirements for deliveries at the NIB and SIB near Yuma and San Luis, Arizona, respectively. Up to 140,000 af annually of agricultural drainage water can be delivered to Mexico at the SIB. The remaining 1,360,000 af of water is to be delivered to Mexico at the NIB annually and diverted at Morelos Dam to the Mexicali Valley. For several years after the United States Bypass Drain was completed in 1978, the Colorado River Channel downstream of Morelos Dam was normally dry. Flows below Morelos Dam now occur only when water in excess of Mexico's requirement arrive at the NIB.

Much of the NIB water is diverted at Imperial Dam into the All-American Canal (AAC) where it is returned to the bed of the Colorado River through Siphon Drop and Pilot Knob Powerplants. A portion of the NIB deliveries remains in the river, passing through Imperial and Laguna Dams to Morelos Dam.

Water in excess of Mexico's water order at the NIB is normally passed through Morelos Dam, through the Limitrophe Division, and into the original Colorado River channel downstream. Water in excess of Mexico's water order occurs primarily when flood releases are made from Lake Mead. Excess water arriving at the NIB may also result from flooding on the Gila River, and from operational activities upstream (i.e., cancelled water orders in the United States, maintenance activities, etc.).

In December of each year, Mexico provides to the United States an advance monthly water order for the following calendar year. Normally, this water order can only be changed by providing the United States with written notice, 30 days in advance and each monthly water order can be increased or decreased by no more than 20 percent of the original monthly water order. The Treaty further stipulates that Mexico's total water order must be no less than 900 cfs and no more than 5500 cfs during the months of January, February, October, November and December. During the remainder of the

year, Mexico's water order must be no less than 1500 cfs and no more than 5500 cfs. Daily water orders are usually not allowed to increase or decrease by more than 500 cfs.

As discussed in Section 3.3.3.3, the model accounts for the all deliveries to Mexico diversions at the NIB (Morelos Dam). Flows that are modeled downstream of Morelos Dam represent mean monthly flows that are excess flows in the Colorado River due to Lake Mead flood control releases. These excess flows may reach the Colorado River Delta, although Mexico has the authority to divert them for other uses. Such decisions by Mexico are not modeled. The excess flows are over and above Mexico's normal 1.5 mafy water entitlement, plus the 200,000 afy for surplus deliveries.

The 90th, 50th, and 10th percentile annual flow volumes for this reach are shown in Figure 3.3-27. Since these flows are dependent solely upon infrequent flood control releases, no flows are observed at either the 10th or 50th percentiles. At the 90th percentile level, all surplus alternatives (except for the Flood Control Alternative) show annual flow volumes less than or equal to the flows under the baseline conditions. This is the result of more frequent surplus deliveries, which tend to lower Lake Mead reservoir levels. With lower reservoir levels, the frequency of flood control events is decreased, which in turn decreases the annual flow volume for a given percentile. The California and Shortage Protection alternatives exhibit the largest decreases, ranging from approximately 70 percent less than baseline conditions in 2016 to 12 percent less by 2023. Results for the Six States and Basin States alternatives are similar to each other, ranging from approximately 47 percent less than baseline conditions in 2013 to 12 percent less by 2023.

In Figure 3.3-28, the cumulative distribution of annual flow volumes is shown for year 2006. This is the year of the largest differences at the 90th percentile level as shown in Figure 3.3-27. Although the annual flow volumes decrease for all surplus alternatives (except Flood Control Alternative) at a fixed percentile (i.e. at the 90th percentile) as compared to baseline, the range of annual flow volumes are the same for baseline conditions and the surplus alternatives. The frequency that a flow of a specific magnitude will occur, however, is lower under the surplus alternatives (except for the Flood Control Alternative) as shown in Figure 3.3-28.

Additional analysis of annual flow volumes in this reach is presented in Section 3-16.

Figure 3.3-27
Colorado River Below Mexico Diversion at Morelos Dam Annual Flow Volume (af)
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

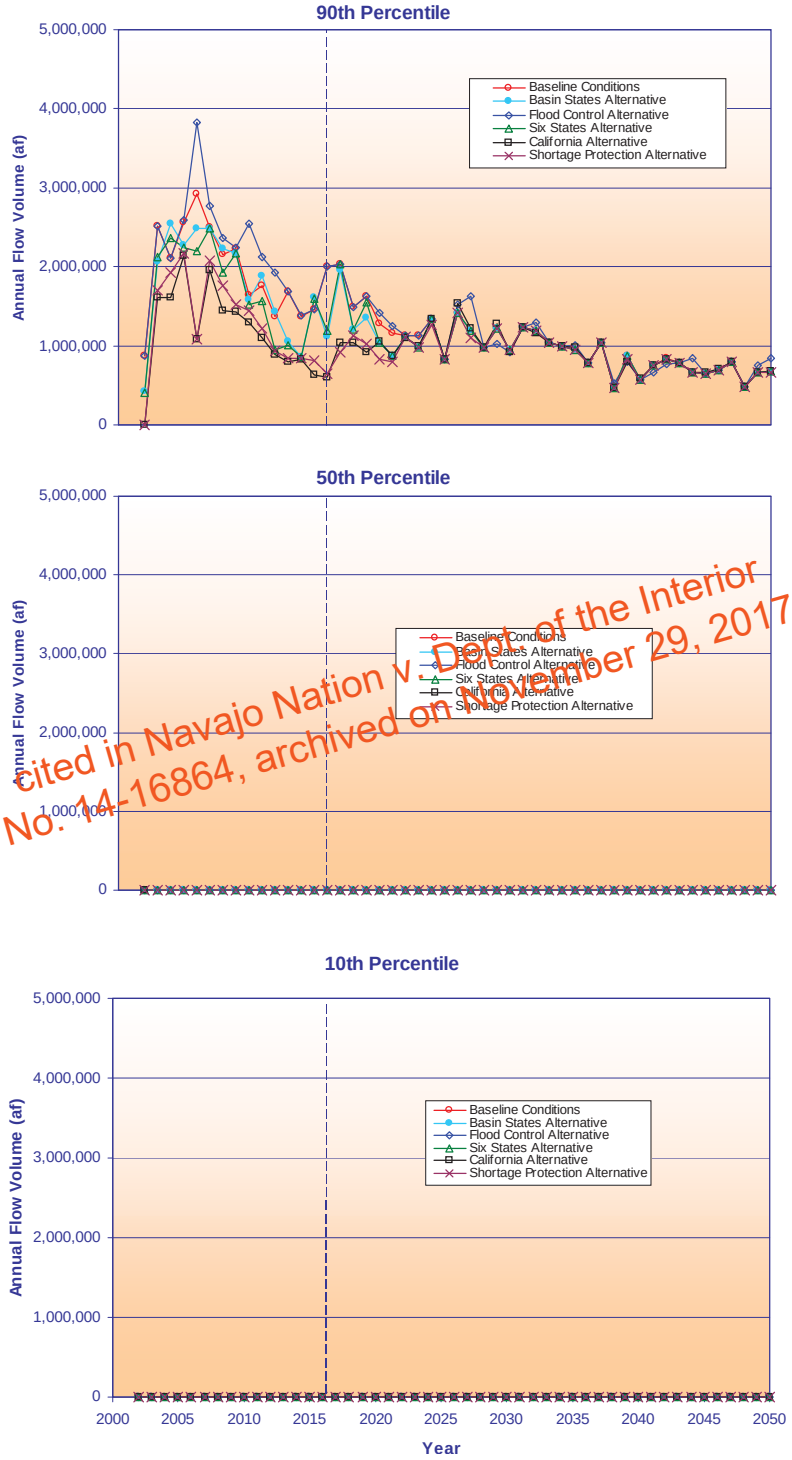
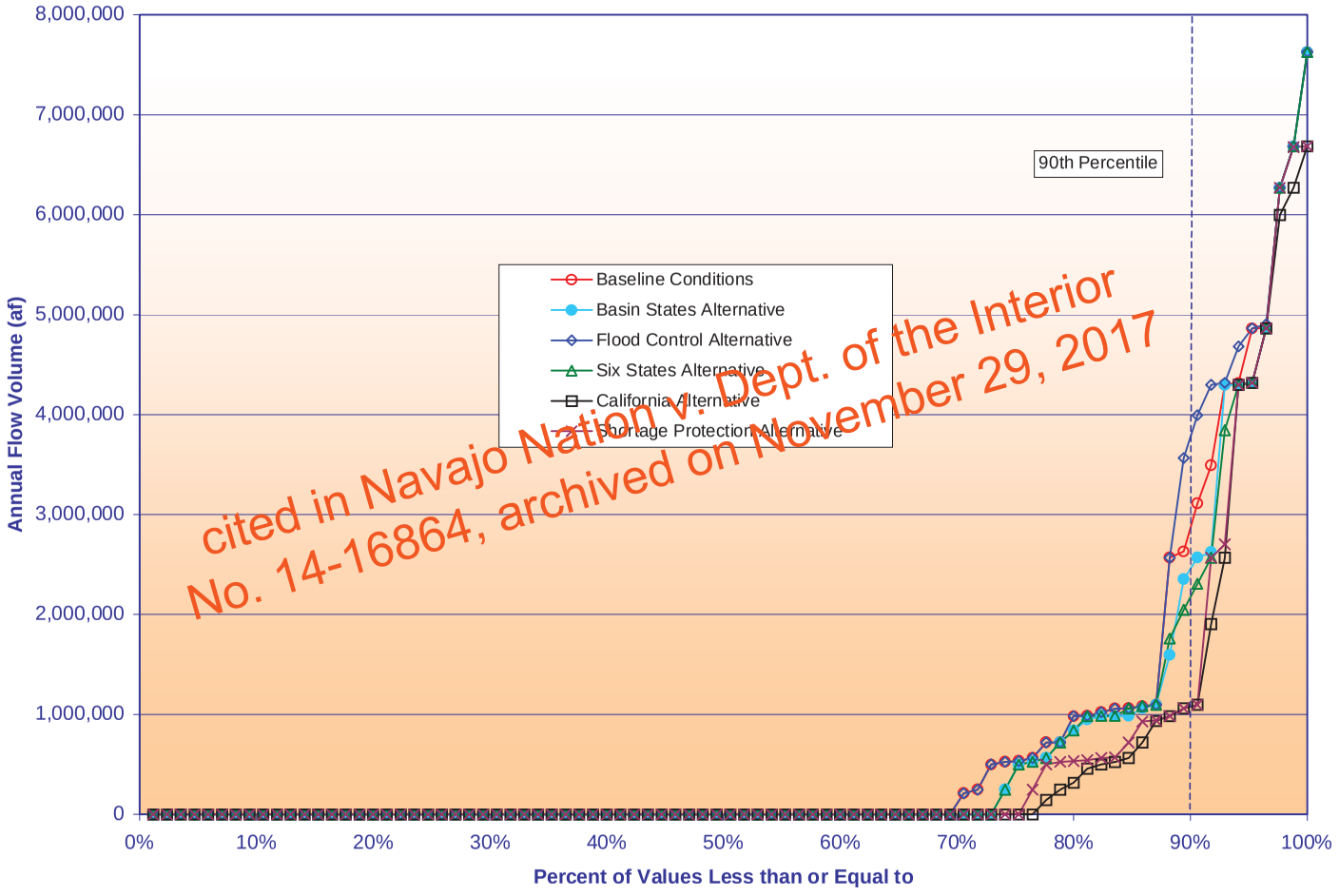


Figure 3.3-28
Colorado River Annual Flow Volumes Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2006



Figures 3.3-29 (a-d) present comparisons of the representative seasonal flows under baseline conditions and the surplus alternatives for 2016. As expected, the only differences are seen for flows that are due to flood control releases from Lake Mead (flows in the 90th – 100th percentile range). As seen in the figures, the range of mean monthly flows is not changed by the different surplus alternatives, since these magnitudes are dictated by the flood control regulations. These flows occur, however, less often for the surplus alternatives (except the Flood Control Alternative). This effect is less pronounced in July, when most flood control releases have ceased.

A numerical comparison of the 90th percentile values is shown in Table 3.3-16. The differences in mean monthly flows for the California Alternative compared to baseline conditions are approximately 51 percent in the winter, zero percent in the spring, zero percent in the summer, and 100 percent in the fall. For the Basin States alternative, the differences (compared to baseline conditions) in mean monthly flows are approximately one percent in the winter, zero percent in the spring, and zero percent in the summer and 100 percent in the fall seasons. The large fluctuating differences are due to the infrequent nature of these flows and are indicative of the decreased frequency of occurrence due to the interim surplus criteria.

Table 3.3-16
Comparison of Mean Monthly Flow Data – Baseline Conditions and Surplus Alternatives
Colorado River Downstream of Morelos Dam (River Mile = 23.1)
90th Percentile Values (cfs) for Year 2016

Season	Mean Monthly Flows (cfs) for Year 2016 at the 70th Percentile					
	Baseline	Basin States	Flood Control	Six States	California	Shortage Protection
Winter	8125	8052	8125	8052	3983	2706
Spring	0	0	0	0	0	0
Summer	0	0	0	0	0	0
Fall	3007	0	3007	0	0	0

Figure 3.3-29a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

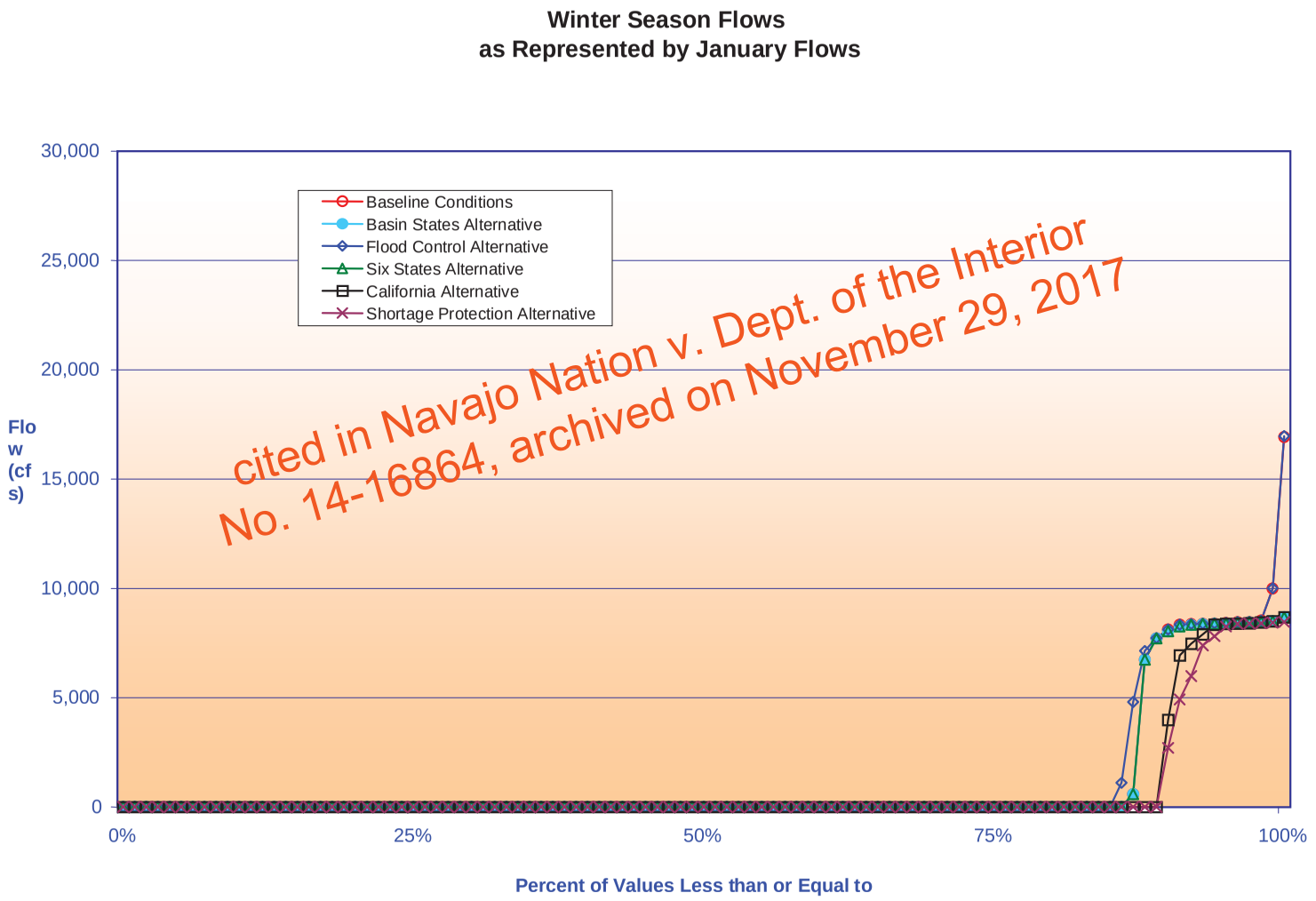


Figure 3.3-29b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

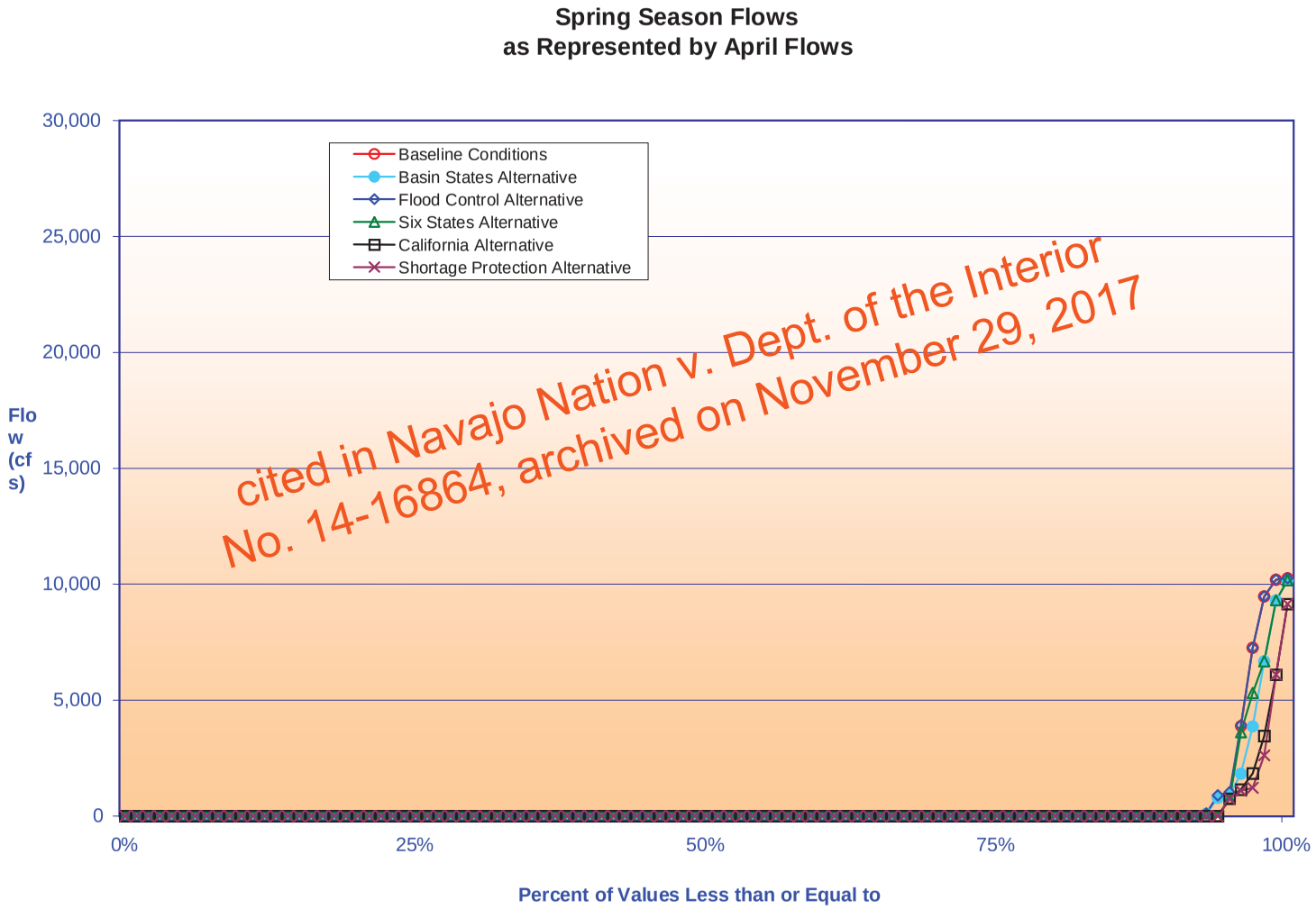


Figure 3.3-29c
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

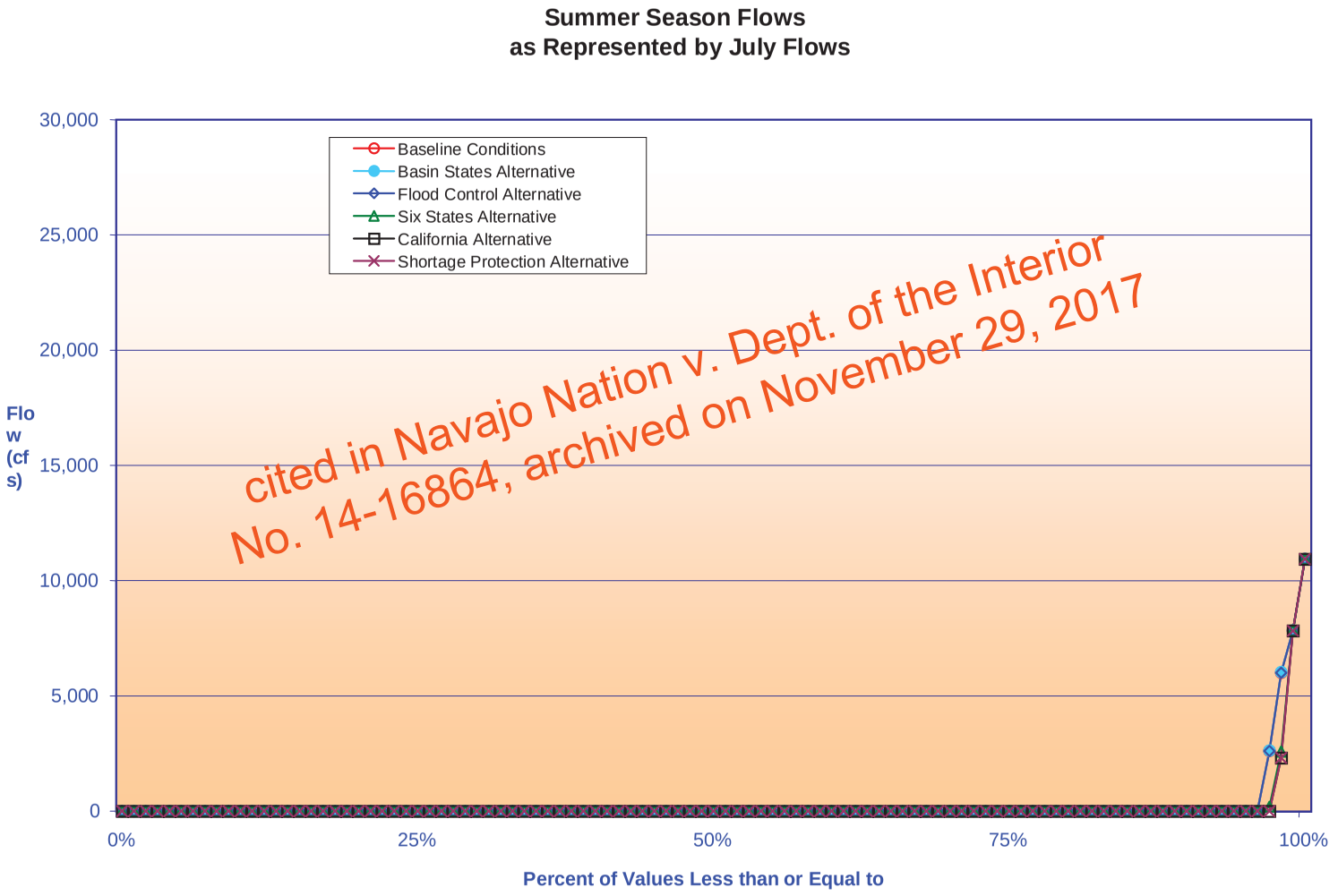
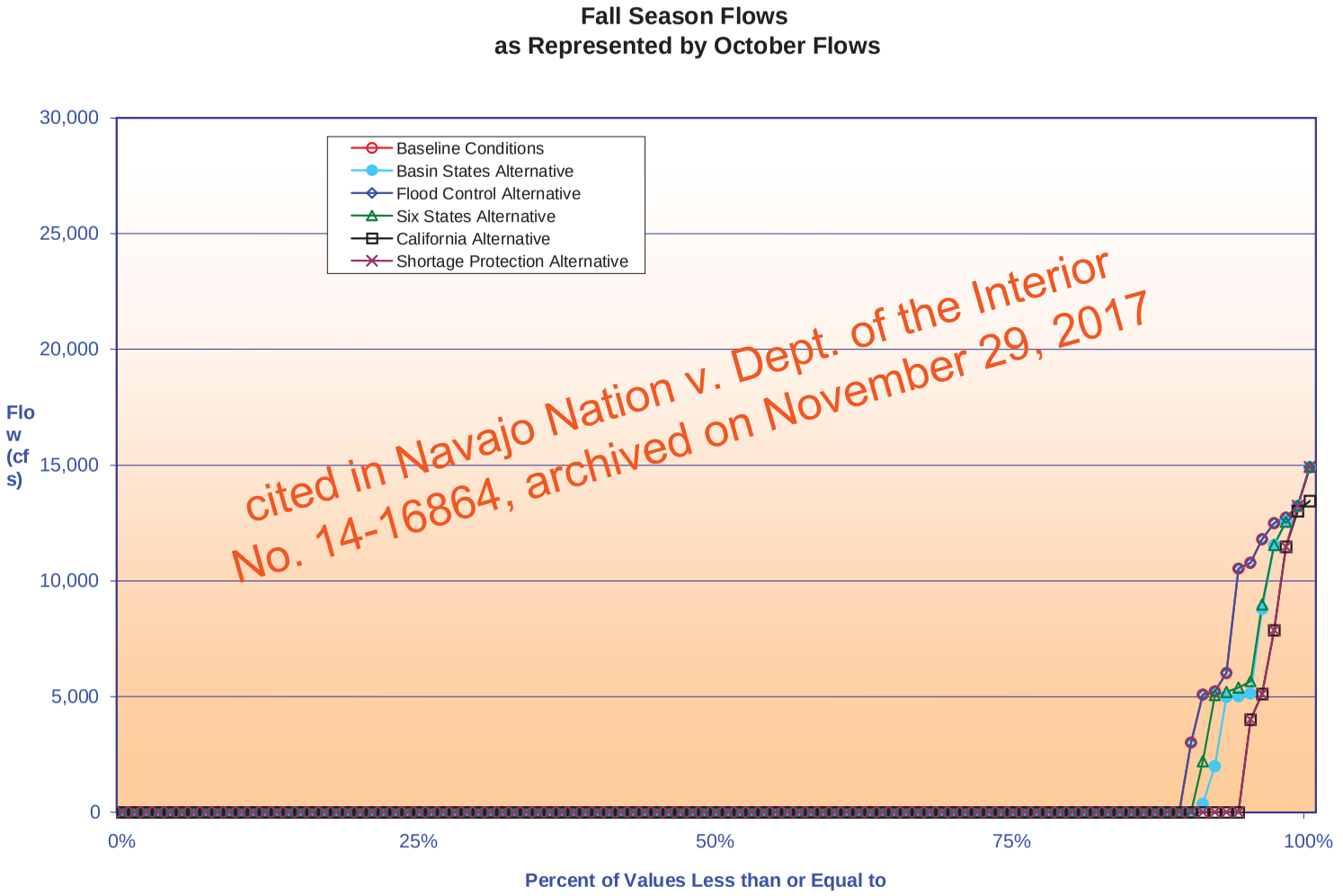


Figure 3.3-29d
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016



3.5 WATER QUALITY

3.5.1 INTRODUCTION

This section addresses the salinity of the Colorado River and mainstream reservoirs, and the quality of Lake Mead water available for municipal and industrial purposes. The potential changes in the operation of the Colorado River system downstream from Lake Powell under interim surplus criteria alternatives could temporarily affect the salinity of Colorado River water, which affects municipal and industrial uses in the Lower Basin. In addition, changes in Lake Mead water levels could affect the quality of water arriving at the SNWS pump intakes in the Boulder Basin of Lake Mead, and thereby affect the quality of the water supply for the Las Vegas Valley.

3.5.2 COLORADO RIVER SALINITY

This section discusses potential effects that could result from the implementation of the interim surplus criteria alternatives under consideration. Salinity has long been recognized as one of the major problems of the Colorado River. "Salinity" or "total dissolved solids" (TDS) include all of the soluble constituents dissolved in a river and the two terms are used interchangeably in this document. This section considers potential changes in salinity concentrations from Lake Mead to Imperial Dam. The section also presents a general discussion of the adverse effects of increased salinity concentrations on municipal and industrial systems.

3.5.2.1 METHODOLOGY

Reclamation's model for salinity is used to create salinity reduction targets for the Colorado River Basin Salinity Control Program (SCP). To do this, the model simulates the effects of scheduled water development projects to predict future salinity levels. This data is then used to compute the amount of new salinity control projects required to reduce the river's salinity to meet the standards at some point in the future (2015). The model itself does not include future salinity controls because implementation schedules for future salinity control projects are not fixed and vary considerably. The salinity control standards are purposefully designed to be long-term (nondegradation) goals, rather than exceedence standards used for industry or drinking water.

By definition, the SCP is designed to be flexible enough to adjust for any changes caused by the various alternatives being considered. Therefore, it could be concluded that there would be no change in compliance with the standards caused by selecting any one of the alternatives. However, for the purposes of this analysis, each alternative has been evaluated using fixed (existing) levels of salinity controls to identify the differences between alternatives and the baseline conditions.

General effects of salinity were determined from review of records of historic river flow and salinity data available and economic impacts presented in *Quality of Water Colorado River Basin – Progress Report No. 19*, 1999, U.S. Department of the Interior; *Water Quality Standards for Salinity Colorado River System, 1999 Review*, June 1999, Colorado River Basin Salinity Control Forum and *Salinity Management Study*, Technical Appendices, June 1999, Bookman-Edmonston Engineering, Inc.

The salinity program as set forth in the Forum's 1999 Annual Review enables the numeric criteria to be met through the year 2015. Therefore, it was presumed that the criteria would be maintained through 2015. Although the 1999 Review considers only the period to 2015, it was presumed that future additions to the salinity control program will be sufficient to maintain the criteria through 2050.

3.5.2.2 AFFECTED ENVIRONMENT

3.5.2.2.1 Historical Data

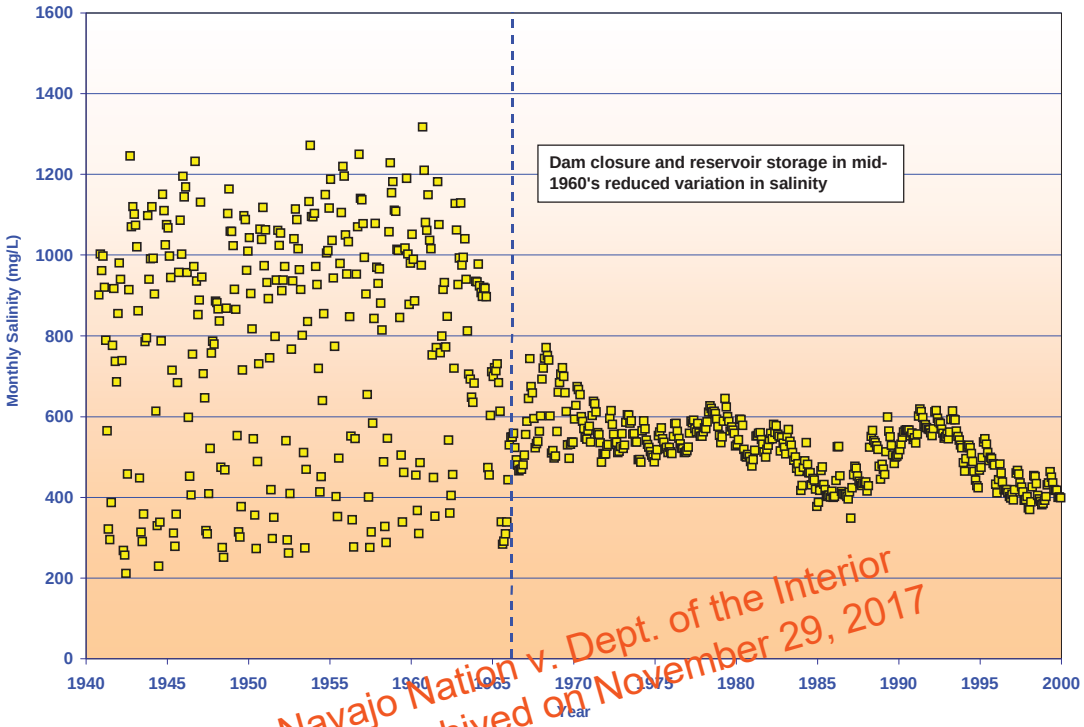
The Colorado River increases in salinity from its headwaters to its mouth, carrying an average salt load of nine million tons annually past Hoover Dam. Approximately half (47 percent) of the salinity concentration is naturally caused and 53 percent of the concentration results from human activities including agricultural runoff, evaporation and municipal and industrial sources (Forum, 1999).

Salinity of the river has fluctuated significantly over the period of record 1941 through 1997. Below Hoover Dam, annual salinity concentrations have ranged from 833 milligrams per liter (mg/l) in 1956 to 517 mg/l in 1986. However, the maximum monthly fluctuation in any year is approximately 50 mg/l. Salinity of the river is influenced by numerous factors including reservoir storage, water resource development (and associated return flows), salinity control, climatic conditions and natural runoff.

The impact of reservoir storage has all but eliminated seasonal fluctuations in salinity. Annual variations in salinity are primarily driven by natural, climatic variations in precipitation and snowmelt runoff. These hydrologic variations cause differences in both flow and salinity.

As shown in Figure 3.5-1, the salinity of the river varied by as much as 1000 mg/l prior to the construction of Glen Canyon Dam in 1961. By the 1980s, that variation was reduced to about 200 mg/l due to the mixing and dampening effect of the large volume of storage in Lake Powell. Figures 3.5-2 and 3.5-3 show the comparison between mainstream flows and salinity. Figure 3.5-2 shows the outflow from Glen Canyon and Imperial Dams. Figure 3.5-3 shows the salinity at Imperial, Hoover and Glen Canyon dams.

Figure 3.5-1
Historical Monthly Salinity Concentrations Below Glen Canyon Dam (1940-1995)



3.5.2.2.2 Regulatory Requirements and Salinity Control Programs

In 1972, the EPA promulgated regulations requiring water quality standards for salinity, numeric criteria and a plan of implementation for salinity control. The Seven Colorado River Basin States, acting through the Forum, adopted numeric criteria for flow-weighted average annual salinity, at three points on the river as shown below:

Below Hoover Dam	723 mg/l
Below Parker Dam	747 mg/l
At Imperial Dam	879 mg/l

Figure 3.5-2
Historical Glen Canyon Dam and Imperial Dam Releases

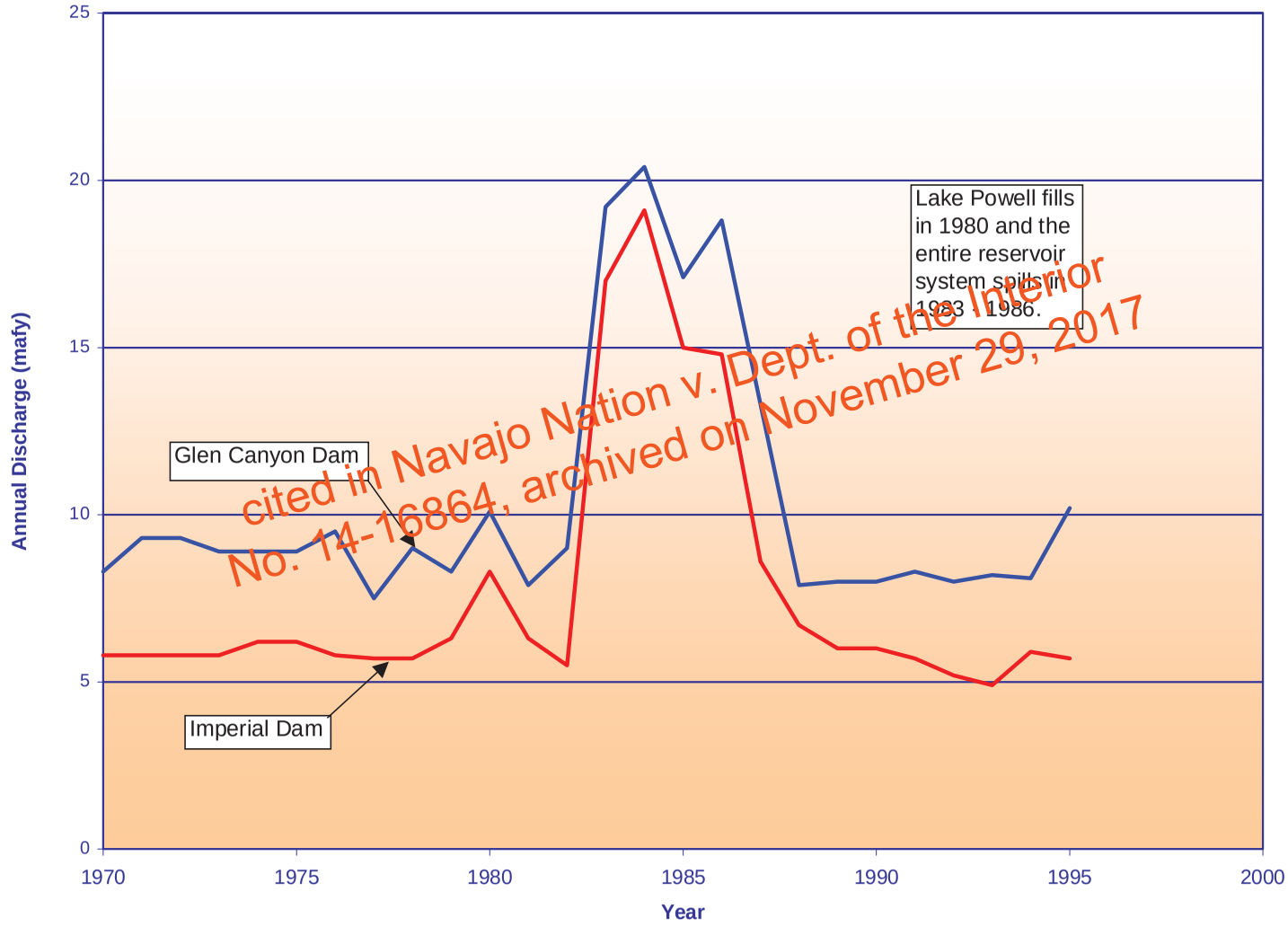
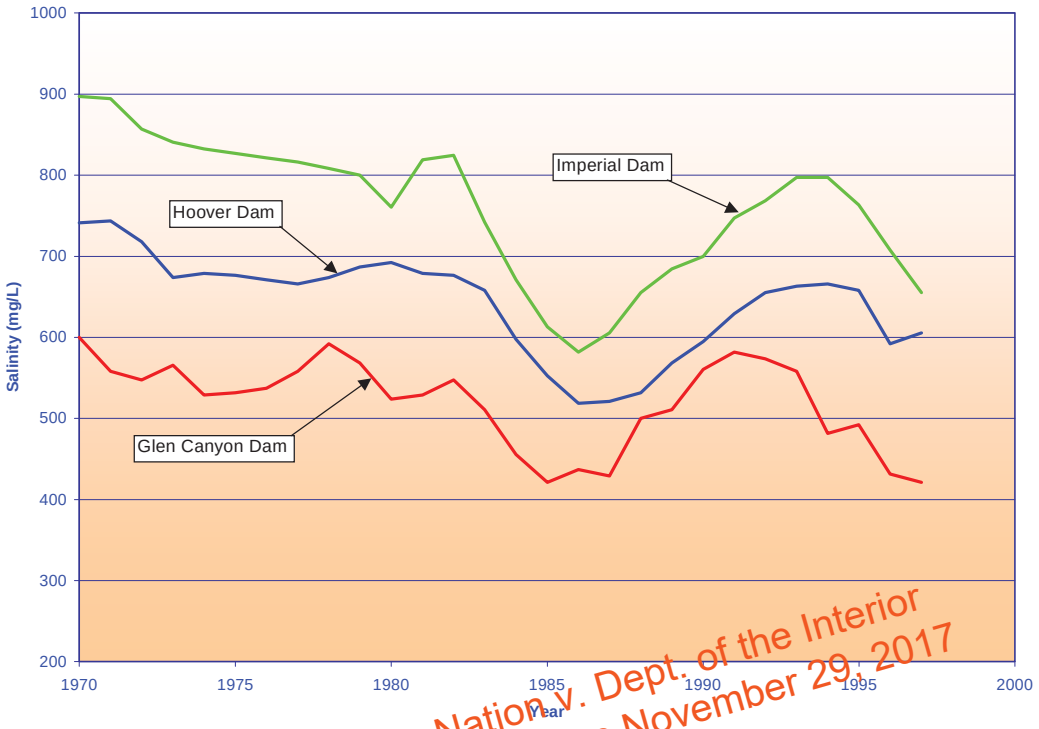


Figure 3.5-3
Historical Salinity Concentrations of Releases from Glen Canyon, Hoover, and Imperial Dams



These criteria applied only to the lower portion of the Colorado River from Hoover Dam to Imperial Dam. Below Imperial Dam, salinity control is a federal responsibility to meet the terms of Minute 242 to the U.S.-Mexico Water Treaty of 1944. Minute 242 requires that salinity concentrations upstream of Mexico's diversion be no more than 115 mg/l $\pm$ 30 mg/l TDS higher than the average salinity of water arriving at Imperial Dam.

In 1974, the Colorado River Basin Salinity Control Act (P.L. 93-320) was enacted. The Act contains two Titles: 1) Title I provides the means for the United States to meet its commitment to Mexico; and 2) Title II creates a salinity control program within the Colorado River Basin in order that the numeric criteria will be maintained while the Basin States continue to develop their apportionment of Colorado River water.

The federal/state salinity control program is designed to maintain the flow-weighted average annual salinity at or below the numeric criteria. The program is not intended to counteract short-term salinity variations resulting from short-term water supply. Federal regulations provide for temporary increases above the criteria due to natural variations in flows.

The seven Basin States acting through the Forum reviews the numeric criteria and plan of implementation every three years and makes changes in the plan of implementation to accommodate changes occurring in the Basin States. The latest review was in 1999. The review is currently undergoing adoption by the Basin States and approval by EPA.

At each triennial review, the current and future water uses are analyzed for their impact on the salinity of the Colorado River. If needed, additional salinity control projects are added to the plan to assure compliance with the standards.

The need for one or more additional salinity control projects is determined by monitoring the salinity of the river and making near-term projections of changes in diversions from and return flows to the river system. When an additional project is needed, it is selected from a list of potential projects that have undergone feasibility investigation. A proposal to implement the project is made through coordination with the Basin States. In selecting a project, considerable weight is given to the relative cost-effectiveness of the project. Cost-effectiveness is a measure of the cost per ton of salt removed from the river system or prevented from entering the river system. Other factors are also considered, including environmental feasibility and institutional acceptability.

It is estimated that 1,478,000 tons of salt will need to be removed or prevented from entering the Colorado River system to maintain the salinity concentration at or below the criteria through 2015. To date, over 720,000 tons have been controlled and an additional 756,000 tons will need to be controlled through 2015.

3.5.1.1.3 General Municipal, Industrial, and Agricultural Effects of Increased Salinity Concentrations

High salinity concentrations can cause corrosion of plumbing, reduce the life of water-using appliances, and require greater use of cleaning products. Industrial users incur extra water treatment costs. Increased salinity in drinking water can create unpleasant taste, often resulting in the purchase of bottled water or water treatment devices. Agriculture experiences economic losses from high salinity through reduced crop productivity and the need to change from less salt-tolerant high value crops, to more salt-tolerant low value crops. Increased salinity can also require more extensive agricultural drainage systems.

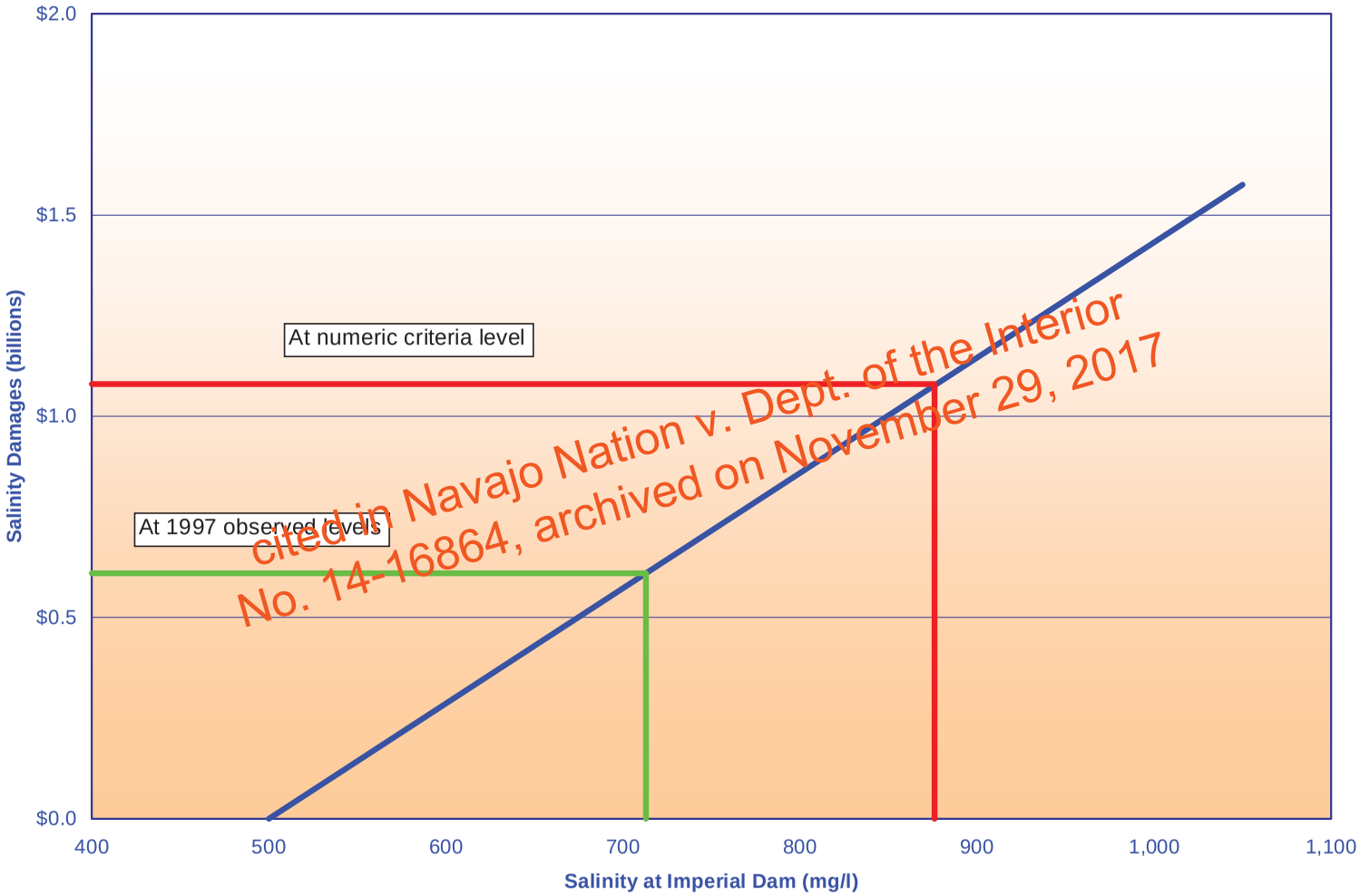
High salinity is a significant constraint to water recycling and groundwater replenishment programs. Compliance with regulatory requirements imposed by local water quality management programs to protect groundwater supplies can add significantly to the economic impacts. Restrictions have been placed on reuse or recharge of waters that exceed specific salinity levels. Such restrictions significantly constrain groundwater replenishment programs and wastewater reuse programs. Should salinity of the Colorado River increase, these regulatory actions could create a need for

more expensive water treatment processes, such as reverse osmosis, prior to disposal or reuse. If disposal is selected, additional water supplies would need to be developed to meet demands that could have been met by water reuse.

Reclamation has determined that the economic damages from Colorado River salinity in the three Lower Division states served by Colorado River water amount to $2.5 million per mg/l. Figure 3.5-4 shows the relationship between costs of damages and salinity concentrations.

Therefore it is assumed for this analysis that the baseline conditions will reflect the numeric criteria at each station of interest (below Hoover Dam, below Parker Dam, and at Imperial Dam).

Figure 3.5-4
Estimated Cost of Damages Associated with Increased Salinity Concentrations



3.5.1.3 ENVIRONMENTAL CONSEQUENCES

The effects of the alternatives on the salinity of Colorado River water focus on their differences from baseline conditions. Since the current model configuration does not include any salinity control projects beyond those currently in place, modeling of baseline conditions indicates increases in salinity due to projected increased water consumption in the Upper Basin. However, in practice, these increases would be offset by salinity control projects that would continue to be implemented.

Tables 3.5-1 and 3.5-2 present these differences for years 2016 and 2050, respectively. The TDS values represent the mean values for the flow-weighted annual averages for the given year. The first column under each monitoring station heading in the tables presents the model projected TDS concentrations under the five alternatives calculated by applying the difference to the baseline TDS level. The second column presents the difference between the values for each alternative compared with baseline conditions.

As shown in Table 3.5-1, there is, in general, very little effect on TDS (less than one percent) due to interim surplus criteria in the year 2016. The exception is the decrease at Imperial Dam for the California Alternative of 19 mg/l (about 2.2 percent). This is due to the assumption in the model of an additional transfer from PVID to MWD of 100,000 af during normal and Tier 3 surplus conditions, which reduces the salt pickup in the return flows.

In general, the surplus alternatives tend to decrease TDS values slightly. These decreases are due to increased equalization releases from Lake Powell relative to baseline.

As shown in Table 3.5-2, interim surplus criteria have no effect on TDS values by the year 2050, with the exception of the PVID to MWD transfer assumed in the California Alternative.

3.5.3 LAKE MEAD WATER QUALITY AND LAS VEGAS WATER SUPPLY

This analysis addresses potential impacts of interim surplus criteria alternatives on water quality in Lake Mead, and potential changes to water quality and levels of contaminants at the SNWA intakes. This is a qualitative analysis based on system modeling and existing limnological studies.

3.5.3.1 METHODOLOGY

Evaluation of the environmental consequences of each operational alternative to Lake Mead water quality and Las Vegas water supply are based on a qualitative assessment of existing limnological and hydrodynamic data, and hydrologic modeling as discussed in Section 3.3. Each interim surplus criteria alternative was modeled for comparison to baseline projections. Modeling focused on the probability of decreased Lake Mead

Table 3.5-1
Estimated Colorado River Salinity in 2016
Unit: Total Dissolved Solids (mg/l)

Alternative	Below Hoover Dam		Below Parker Dam		At Imperial Dam	
	Value	Departure from Baseline	Value	Departure from Baseline	Value	Departure from Baseline
Baseline Conditions[1]	723	NA	747	NA	879	NA
Basin States	719	-2	737	-2	879	0
Flood Control	723	0	745	-0	879	0
Six States	719	-2	738	-2	881	0
California	712	-5	734	-5	853	-19
Shortage Protection	715	-4	736	-4	872	-3

1 Baseline conditions assume compliance with the numeric criteria at the locations cited.

Table 3.5-2
Estimated Colorado River Salinity in 2050
Unit: Total Dissolved Solids (mg/l)

Alternative	Below Hoover Dam		Below Parker Dam		At Imperial Dam	
	Value	Departure from Baseline	Value	Departure from Baseline	Value	Departure from Baseline
Baseline Conditions[1]	723	NA	747	NA	879	NA
Basin States	723	0	747	0	877	0
Flood Control	723	0	747	0	879	0
Six States	723	0	747	0	878	0
California	722	-1	745	0	857	-24
Shortage Protection	722	-1	747	0	876	0

1 Baseline conditions assume compliance with the numeric criteria at the locations cited.

surface elevations, which could exacerbate effects of discharge of Las Vegas Wash water into Boulder Basin.

Assessment of potential effects on water quality of Lake Mead, including consideration of Las Vegas Wash inflow on the SNWA intake, relied primarily on system modeling information associated with the probability of future Lake Mead surface elevations. Previous studies of Lake Mead were also an important source of information, particularly those focusing on Boulder Basin, Las Vegas Wash, and hydrodynamics potentially affecting intake water quality.

As discussed in Section 3.3, modeling identified probabilities associated with surface water elevations under baseline conditions as well as projections associated with implementation of the interim surplus criteria alternatives over a 50-year period. As discussed previously, model output utilized for this water quality analysis assumes shortage determinations would occur, if necessary, to protect a surface elevation of 1083 feet msl, which is the Lake Mead minimum power pool elevation. The primary SNWA intake at Saddle Island is at 1050 feet msl, and the secondary intake is at 1000 feet msl. Thus, assuming a strategy to protect 1083 feet msl also provides a level of protection to SNWA's intake water quality.

As discussed below, contaminant dilution and lake water quality are directly proportional to lake volume. As such, a critical element in this assessment is a comparison of projected Lake Mead volumes under the five action alternatives relative to baseline conditions. Using hydrologic modeling output, median Lake Mead volumes and surface areas were identified for each of the alternatives associated with projected reservoir elevations under the median modeled probabilities. Modeling results indicating these parameters were then developed for the years 2016, 2026, 2036, and 2050. Separate comparisons were then made of the volume and surface area for each alternative as compared to baseline conditions.

3.5.3.2 AFFECTED ENVIRONMENT

The focus of this section is a description of the affected environment related to Lake Mead water quality and the SNWA intake locations, with specific consideration of hydrodynamics of the Colorado River Basin, limnology and water quality (factors that may be influenced by implementation of interim surplus criteria alternatives).

3.5.3.2.1 General Description

Lake Mead is a large mainstream Colorado River reservoir in the Mohave Desert, within the States of Arizona and Nevada as shown on Map 3.2-1. Lake Mead, formed in 1935 following the construction of Hoover Dam, is the largest reservoir in the United States by volume (26 maf active storage). At full pool (reservoir elevation 1221 feet msl), Lake Mead extends 108 miles from Black Canyon (Hoover Dam) to Separation Canyon

at the upstream end. Lake Mead has four large sub-basins including Boulder, Virgin, Temple and Gregg. Between these basins are four narrow canyons: Black, Boulder, Virgin and Iceberg. Over 170,000 square miles of the Colorado River Basin watershed are located above Hoover Dam. Boulder Basin, SNWA intake locations and the Las Vegas Wash are shown on Map 3.5-1.

The Muddy and South Virgin mountains border the reservoir on the north, and the Virgin and Black mountains and various desert hills border the reservoir on the south. The shoreline is extremely irregular with a Shoreline Development Value (SLD) of 9.7 (Paulson and Baker, 1981). SLD is the ratio of the length of the shoreline of a lake or reservoir to the length of the circumference of a circle with an area equal to that of the lake (Wetzel, 1975). The shoreline includes several large bays, including Las Vegas and Bonelli, and numerous coves. The principal morphometric characteristics of Lake Mead are summarized below in Table 3.5-3.

Table 3.5-3
Morphometric Characteristics of Lake Mead

Parameter	Units	Value
Normal operating level (spillway crest)	feet	1,205
Maximum depth	feet	590
Mean depth	feet	180
Surface area	square miles	231
Volume (including dead storage)	maf	30
Maximum length	miles	108
Maximum width	miles	17
Shoreline development	Index Value	9.7
Discharge depth	feet	310
Annual discharge (approximate)	maf	10
Replacement time at maximum operating level	years	3.9

Derived from Interior (1966), Lara and Sanders (1970), Hoffman and Jonez (1973)

LaBounty and Horn (1997) conducted a study of the influence of drainage from the Las Vegas Valley on the limnology of Boulder Basin that is highly relevant to the issue addressed in this section. Unless otherwise noted, the descriptions of reservoir characteristics, hydrodynamics, and general limnology of Lake Mead are drawn from this study.

The Colorado River contributes about 98 percent of the annual inflow to Lake Mead; the Virgin and Muddy rivers and Las Vegas Wash provide the remainder. Annual flows from Las Vegas Wash are approximately 155,000 af, providing the second highest inflow into Lake Mead. Discharge from Hoover Dam is hypolimnetic and occurs 285 feet below the normal operating shown above (1205 feet msl). Average annual discharge is approximately 10 maf.

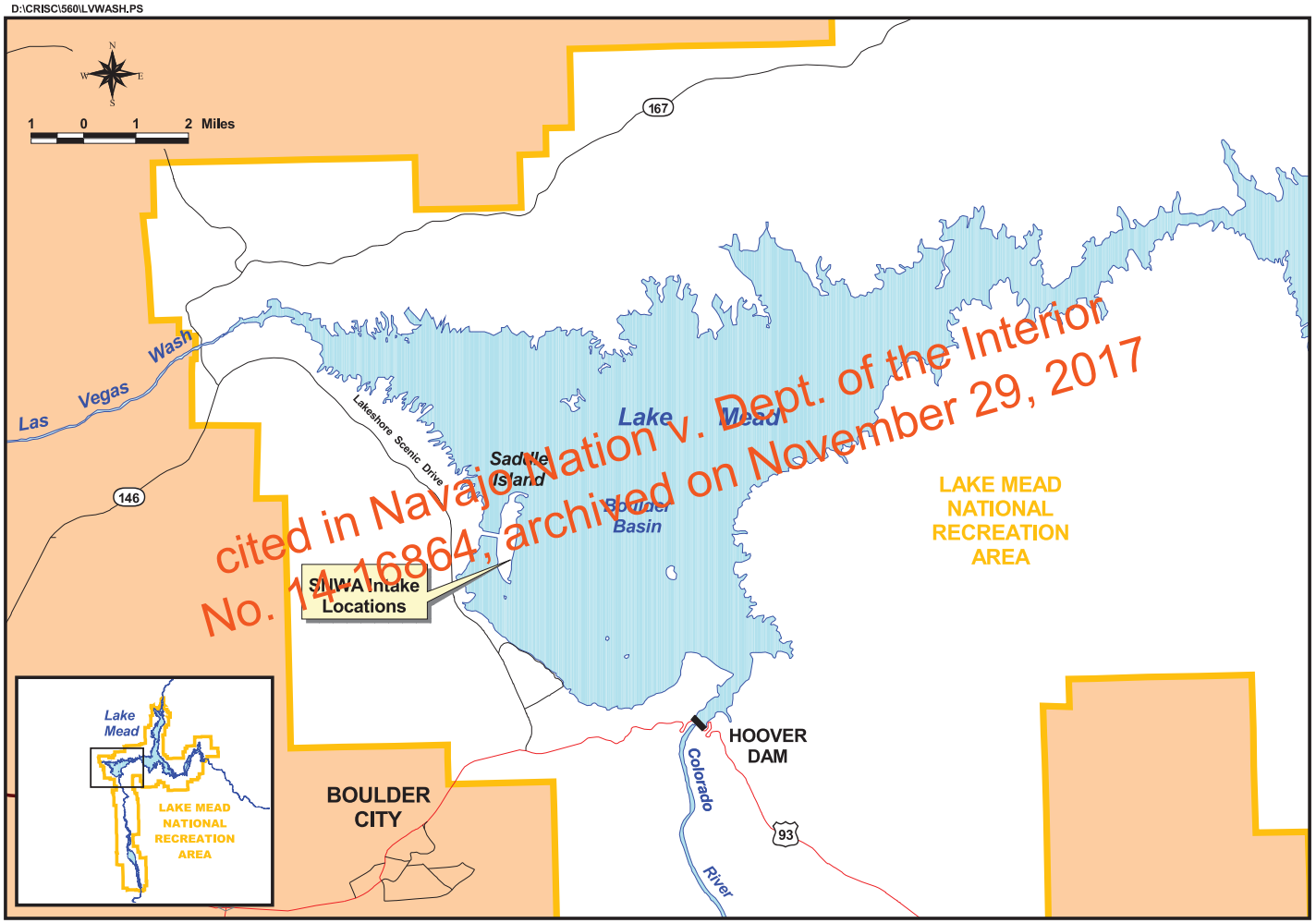
Boulder Basin, the lowermost basin of Lake Mead, receives all nonpoint surface and groundwater discharges and treated effluent from the Las Vegas Valley and municipal wastewater treatment facilities via drainage from Las Vegas Wash into Las Vegas Bay. Boulder Basin is 9.3 miles wide from Boulder Canyon to Hoover Dam (Black Canyon), and the distance from the confluence of Las Vegas Wash to Hoover Dam is approximately 9.9 miles. The historical Colorado River channel lies along the eastern side of Boulder Basin.

Due to effects of urban runoff and treatment plant effluents on the discharge through Las Vegas Wash (discussed later in this section), Boulder Basin has the highest nutrient concentrations in the Lake Mead system (Paulson and Baker, 1981; Prentki and Paulson, 1983). This is in contrast to the normal upstream-downstream decrease in the pattern of productivity more typical of reservoirs, and results in several limnological features within Boulder Basin that are normally associated with upstream reaches (Kimmel et al., 1990).

Overall, Lake Mead is mildly mesotrophic based on several classification indices (Vollenweider 1970; Carlson 1977), including chlorophyll *a* concentration and secchi transparency measurements. Chlorophyll concentration is a measure of algal biomass and can, therefore, be interpreted as an index of lake productivity. Secchi disk measurements are used to determine the depth to which light penetrates lake water and help to establish the euphotic zone which marks that area in a lake where primary productivity (energy production by photosynthesis) occurs.

Due to abundant nutrient input into Las Vegas Bay, chlorophyll concentrations have been measured greater than 100 milligrams per cubic meter (mg/m^3). Secchi transparency readings of less than two feet have been measured in the inner bay (LaBounty and Horn, 1997). However, secchi transparency increases to over 16 feet, and chlorophyll *a* is reduced by 90 percent within the first 2.6 miles from the Las Vegas Wash inflow. These findings suggest that Boulder Basin is a relatively isolated embayment and that it is much more productive than the lake as a whole.

Map 3.5-1
Las Vegas Wash and SNWA Lake Mead Intake Facilities at Saddle Island



The Federal Water Pollution Control Act (Clean Water Act) Amendments of 1972 and 1977 require the control of all sources of water pollution in meeting the goals of the Act. Section 208 of the Act requires that all activities associated with water pollution problems are planned and managed through an integrated area-wide water quality management program. It also defines the schedule and scope of area-wide wastewater treatment management plans. The 1997 Las Vegas Valley 208 Water Quality Management Plan Amendment certified by the State of Nevada and EPA, is a 20-year plan that comprehensively addresses the quality and quantity of the Valley's point source (discharges from wastewater treatment facilities) and non-point sources (groundwater, stormwater issues, Las Vegas Wash, agricultural diffuse sources), and revisions of water quality standards.

The water quality requirements currently being met by the wastewater discharges of the Las Vegas Valley have a long history. Beginning in the 1950s with requirements for secondary treatment, through the 1970s and the promulgation of the Clean Water Act, and into the 1990s with more advanced nutrient removal requirement, the quality and volume of treated wastewater discharged to Lake Mead has continued to increase and will continue to meet standards into the future through the Section 208 process (Clark County, 1997).

The Lake Mead Water Quality Forum, established by the Nevada Division of Environmental Protection (NDEP), has been identified in the Plan as an avenue for coordinated research opportunities and solutions to the water quality issues that face Las Vegas Valley and Lake Mead in the future. The forum is comprised of federal, state and local agencies with a vested interest in Lake Mead's water quality. The Lake Mead Water Quality forum is responsible for issue identification, coordination and defining the process approach in identifying issues regarding water quality and potential impacts to the water supply. The Las Vegas Wash Coordination Committee (LVWCC) is comprised of more than two dozen members of local, state, and federal agencies, business owners and members of the public. The LVWCC was tasked with the support, development and implementation of the Las Vegas Wash Comprehensive Adaptive Management Plan (LVWCAMP). The planning phase of the LVCAMP is now complete, and various actions presented in the plan are currently in progress to restore the wash, its wetlands, and its ability to improve the quality of return flows into Lake Mead. Reclamation is an active member of both of these groups and has been independently funding research on Lake Mead water quality prior to their formation and is now a funding partner with other agencies for ongoing studies on the Wash and Lake Mead. Water quality in Lake Mead and Las Vegas Wash are the subject of numerous articles and the chemical and physical analyses of raw and treated Lake Mead source water is published on SNWA's website (http://www.snwa.com).

3.5.3.2.2 Lake Mead Water Quality and Limnology

Water quality of Lake Mead and the Colorado River is alkaline with a pH of 8.3 and an average concentration of TDS of approximately 700 mg/l. Chemical characteristics of the river at the inflow to Lake Mead, near the outflow at Hoover Dam, and at Lake Mohave are shown below in Table 3.5-4.

Table 3.5-4
Chemical Characteristics of Colorado River

Parameter	Units	Gage Station Location[1]		
		Grand Canyon	Hoover Dam	Davis Dam
pH		8.0	7.7	8.0
Conductivity	umho/cm[2]	945	1086	1089
Total Dissolved Solids	mg/l	617	705	714
Calcium	mg/l	74	86	84
Magnesium	mg/l	26	28	29
Potassium	mg/l	4.1	4.9	5.0
Bicarbonate	mg/l	170	163	157
Sulfate	mg/l	228	283	293
Chloride	mg/l	79	85	87
Silica	mg/l	7.0	8.3	7.8
Nitrate	mg/l	.50	.41	.28
Phosphate	mg/l	.010	.013	--

[1]USGA data, average for October 1975 - September 1976

The principal constituents of TDS are the anions of sulfate, carbonate and chloride and the cations of sodium, calcium, magnesium and potassium. Nitrate concentrations are moderate (0.28 to 0.50 mg/l), but phosphorus is extremely low (0.01 to 0.03 mg/l). Silica is present in very high concentrations (7.0 to 8.3 mg/l).

Limnological investigations of Lake Mead have found that 80 percent of the inorganic nitrogen within the lake is provided by the Colorado River, and that Las Vegas Wash contributes 70 percent of the inorganic phosphorus (Paulson, Baker, Deacon, 1980). The Upper Basin of Lake Mead was found to be phosphorus-limited, and the Lower Basin nitrogen-limited during the summer. Equal proportions of nitrogen and phosphorous were retained in the Upper Basin of Lake Mead, but nitrogen retention decreased to seven percent, and phosphorus to 33 percent in the Lower Basin. Additionally, the high nitrate loss from Hoover Dam greatly reduced nitrogen retention in the Lower Basin of Lake Mead.

In 1978 the EPA estimated that Lake Mead retained 93 percent of the total phosphorus input versus 52 percent of total nitrogen (EPA, 1978). Phosphorus concentrations are

low in the Upper Basin of the lake due to the low input from the Colorado River, a result of sediment trapping that occurs upstream within Lake Powell.

As recently as 1998, new contaminants to Lake Mead have been discovered as a part of the nonpoint pollutant load of Las Vegas Wash (EPA, 2000). Perchlorate has been detected in the water of the Colorado River and Lake Mead. Ammonium perchlorate is manufactured as an oxygen-adding compound in solid rocket fuel propellant, missiles and fireworks. The EPA identified two facilities that manufactured ammonium perchlorate in Henderson, Nevada, that were found to have released perchlorate to groundwater, resulting in four to 16 parts per billion (ppb) concentrations in Lake Mead and the Colorado River (EPA, 2000).

The NDEP and the SNWA have initiated a collective investigation to locate and clean up perchlorate in the Colorado River system in coordination with the EPA. The primary objectives are to locate the source, the groundwater discharge sources, clean it up, and prevent it from becoming a problem in the future. The EPA has not established concentration levels of perchlorate because it is not considered a water contaminant. However, California's Department of Health Services and NDEP have established an interim action level of 18 ppb for drinking water. Concentrations lower than 18 ppb are not considered to pose a health concern for the public, including children and pregnant women. All SNWA drinking water has tested at 11 ppb or lower for perchlorate. Average perchlorate values for water samples collected at their intake were 9.5 ppb between June 1999 and August 2000. Perchlorate is not regulated under the Federal Safe Drinking Water Act and thus information is limited regarding its potential health risks but it is known to affect how the thyroid processes iodine and is used to treat Graves Disease. In March 1998, perchlorate was added to the Contaminant Candidate List as part of the Safe Drinking Water Act due to the concern over potential public health impact, need for additional research in areas of health effects, treatment technologies, analytical methods, and more complete occurrence data.

The SNWA identified a major surface flow of perchlorate-laden water from a groundwater discharge point along Las Vegas Wash in late 1999. Other discharge points are being investigated. Kerr-McGee Chemical Company, with the NDEP, and Reclamation as the land management agency, worked together to begin intercepting that surface flow for treatment. This program is now underway and has significantly reduced the amount of perchlorate entering the Las Vegas Wash, Lake Mead, and the Colorado River. This remediation program will continue into the future and will continue to reduce perchlorate contamination in groundwater and Colorado River water in Lake Mead and downstream.

In a soon to be published article on contaminants found in Lake Mead fish by Dr. Jim Cizdziel, University Nevada Las Vegas, only one fish sampled of approximately 300 fish tissues sampled for mercury indicated results above the Federal Department of Agriculture's 1.0 ppm level of concern. During this 1998-1999 investigation for metals

found in Lake Mead fish tissue, most fish sampled for mercury were less than 0.5 ppm (Pollard, 1999). After reviewing this work, the State of Nevada has decided not to issue any fish consumption advisories for any contaminates for Lake Mead fish (Pohlmann, 1999).

The rate and volume of inflow from the Colorado River are major determinants of the limnology of Lake Mead, with minor contributions to volume coming from the Virgin and Muddy rivers and the Las Vegas Wash (see Table 3.5-5). Due to its lower conductivity within Lake Mead, Colorado River flows can be identified through the reservoir. Flows into Lake Mead average approximately 17,900 to 21,400 cfs. During a seven-day controlled flood in 1996, inflows of 44,600 cfs resulted in a three-foot rise in surface elevation. Flows of this magnitude influence reservoir limnology of Lake Mead well into Boulder Basin (LaBounty and Horn, 1997).

Table 3.5-5
Hydraulic Inputs for Lake Mead

Input	Flow (af)	% of Total
Colorado River	8,800,000	98
Virgin River	92,000	1
Las Vegas Valley Wash	59,000	0.60
Muddy River	29,000	0.34
TOTAL INPUT	**9,000,000**	**100**

Derived from USGS data from October 1975 – September 1976

The two major outflows from Lake Mead are both in Boulder Basin: Hoover Dam and the SNWA intake. Hoover Dam is operated for flood control, river regulation and power production purposes. The operating elevation for Hoover Dam powerplant ranges from 1083 feet to a maximum elevation of 1221 feet msl. The dam's four intake towers draw water from the reservoir at approximate elevations 1050 and/or 900 feet msl to drive the generators within the dam's powerplant. SNWA pumps water from two adjacent intakes located at Saddle Island that operate down to elevations of 1050 feet and 1000 feet msl. Hoover Dam outflows vary on a daily basis from approximately 2000 cfs to 50,700 cfs. Capacity of the SNWA intake is 600 cfs. Despite its much smaller volume, the SNWA intake has been shown to influence deep water currents near the entrance to Las Vegas Bay (Sartoris and Hoffman, 1971).

LaBounty and Horn (1997) cite the rarity of complete turnover in Lake Mead due to the great depth (590 feet), and relatively constant temperature gradient. The thermal regime over the period of 1990 through 1996 was characterized by surface temperatures of 14 degrees Celsius (°C) in December and January to over 30°C in August. Seasonal thermoclines range from 50 feet in early summer to 100 feet in late summer. Hypolimnetic temperatures remain near 12°C year-round. Though full reservoir

turnover seldom occurs, turnover occurs to a depth of approximately 200 to 230 feet in January and February, a sufficient depth for complete mixing in Las Vegas Bay.

As with other reservoirs, dam operation exerts a great influence on the water quality and ecology of the system (Thornton, 1990). The hydrodynamics of this large reservoir are complex and not completely understood. Each basin within Lake Mead is ecologically unique, and therefore responds differently to the inflow-outflow regime. Furthermore, the different sources of water entering Lake Mead often retain their identity for substantial distances into the reservoir and do not necessarily mix completely with the rest of the water column (Ford, 1990). This spatial heterogeneity can lead to significant underestimates of actual water retention time, conveyance and fate of materials transported into the reservoir.

3.5.3.2.3 Hydrodynamics of Lake Mead and Boulder Basin

The Colorado River, Virgin and Muddy rivers and Las Vegas Wash all form density currents in Lake Mead (Anderson and Pritchard, 1951; Deacon and Tew, 1973; Deacon 1975, 1976, 1977; Baker et al., 1977; Baker and Paulson, 1978). Anderson and Pritchard (1951) conducted a detailed investigation of density currents in 1948-1949 using temperature and TDS relationships to trace the river inflows. They found that the Colorado River flowed along the bottom of the old river channel in winter (January-March). The underflow was detectable well into the Virgin Basin and at times extended to Boulder Basin. The underflow created a strong convergence at the point where river water flowed beneath lake water. Up-lake flow of surface water occurred due to frictionally induced, parallel flow of lake water (entrainment) along the boundary of the cold river inflow. This produced a large circulation cell in the Upper Basin of Lake Mead, as surface water was pulled up-lake to replace that entrained by the underflow.

Hydrodynamics within Las Vegas Bay have also been the subject of research and are particularly important from the standpoint of potential interactions between Las Vegas Wash water and intake water quality. LaBounty and Horn (1997) provide an excellent discussion of flow patterns in this area of Lake Mead. These authors cite unique signatures of both Colorado River water and Las Vegas Wash water that allow mapping of higher conductivity intrusions from Las Vegas Wash into Boulder Basin. Depending on conditions, the intrusion can be measured for over five miles into Lake Mead. Seasonally, the Las Vegas Wash intrusion is deepest in January and February (130 to 200 feet) and shallowest in early spring (33 to 50 feet).

Water quality in Las Vegas Wash, and ultimately in Boulder Basin, is heavily influenced by urban runoff, as well as the treated effluent from three major sewage treatment facilities upstream. Historically, flows in this basin drained wetlands, which allowed for natural cooling and nutrient removal. Flows today are warmer and have doubled in volume over the last 15 years, from 110 cfs to 215 cfs (LaBounty and Horn,

1997). These factors have tended to force the intrusion higher in the water column of Las Vegas Bay.

The existence of contaminants in sediments and fish tissue in Las Vegas Bay, and poor water quality has been well documented (LaBounty and Horn, 1996; Roefer et al., 1996; Bevans et al., 1996). LaBounty and Horn (1997) cite the relatively close proximity of the SNWA intake at Saddle Island to potential intrusions of the Las Vegas Wash, and conclude that changes in hydrodynamics of the basin (i.e., due to drought or management actions) are critical considerations in assessing effects of the Las Vegas Wash on drinking water quality.

3.5.3.3 ENVIRONMENTAL CONSEQUENCES

3.5.3.3.1 General Effects of Reduced Lake Levels

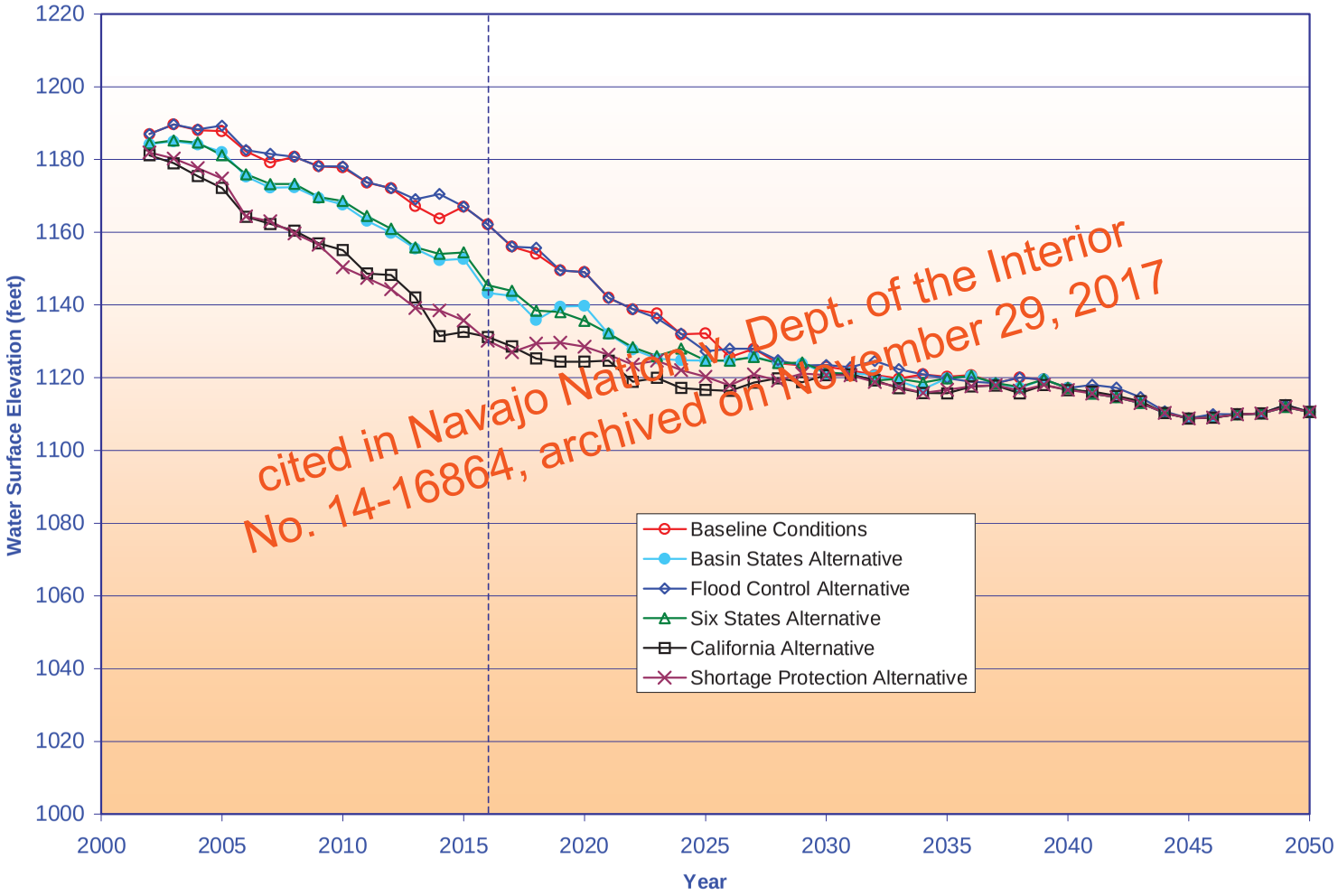
This section presents potential water quality changes in Lake Mead associated with reductions in lake levels, and potential effects of these changes on the concentration of Las Vegas Wash water at SNWA water supply intakes. In addition, this section addresses general limnological changes in Lake Mead that may occur under each alternative.

It is important to note that estimates of potential changes in Lake Mead surface elevations are based on system modeling discussed in Section 3.3. Water quality modeling has not been conducted as a part of this investigation; however, literature review and assumptions with regard to Las Vegas Wash mixing in the Boulder Basin under various Lake Mead elevations have been used to estimate potential future water quality conditions.

Results of model runs conducted for this analysis indicate that projections of baseline conditions and each of the interim surplus criteria alternatives indicate increased potential over time for the occurrence of declining Lake Mead surface elevations within and beyond the interim 15-year period, as indicated by the plots of median elevations on Figure 3.5-5.

The potential degradation of SNWA intake water is not demonstrated quantitatively in this FEIS, rather the expectation of degradation is based on the assumption that decreasing lake levels, and therefore lake volume and surface area, could result in decreased water quality and, more specifically, increased concentration of Las Vegas Wash inflow at the intake locations. The potential effects associated with Lake Mead elevation declines are described below, and are followed by a tabular comparison of the projected Lake Mead volume and surface area changes under the alternatives and baseline conditions.

Figure 3.5-5
Lake Mead End-of-Year Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
50th Percentile Values



3.5.3.3.1.1 Volume Reduction

Reduction in the volume of Lake Mead would likely have effects on lake water quality and, potentially, on water quality withdrawn by SNWA. These effects occur as a result of changes in mixing patterns in Boulder Basin. Given the hydrodynamics of Boulder Basin associated with the relatively confined nature of the embayment, effects of reduction in volume of Lake Mead would likely be disproportionately greater in Boulder Basin than in the lake as a whole. LaBounty and Horn (1997) cite the importance of salinity and thermal gradients in determining the extent of intrusion of the Las Vegas Wash into Boulder Basin. Lower lake volumes could increase the overall salinity of the Boulder Basin, thereby lowering the differential between lake water and inflows of the Las Vegas Wash. This in turn may act to disperse the intrusion, causing a more diffuse flow from Las Vegas Wash, a greater concentration of nutrients and contaminants throughout Boulder Basin, and greater availability of nonpoint contaminants in the vicinity of the SNWA intakes. Clark County's 208 Water Quality Plan certified by EPA and NDEP, regulates the quality and quantity of discharges from wastewater treatment facilities that flow into Lake Mead. These discharges currently meet standards and will do so into the future (Clark County, 1997). The SNWA is in the process of upgrading its raw water treatment facilities and these state of the art facilities will be able to meet any treatment challenges from reduced reservoir levels caused by drought or declines from interim surplus alternatives.

3.5.3.3.1.2 Tributary Water Quality

Lower water surface elevations in Lake Mead could also impact the quality of tributary flows from the Las Vegas Wash, Virgin and Muddy rivers. These effects would be a result of longer channels, and thus, longer travel times for influent streams. Potential effects on Lake Mead could include increased temperature due to warmer tributary flows. Higher evaporative losses and greater concentration of salts and contaminants may also occur in tributaries due to longer channels, leading to higher concentrations of pollutants in the Las Vegas Wash, and potentially greater concentrations of contaminants near the SNWA intakes. However, new riparian habitat development near the mouths and in these tributaries would likely develop and would be expected to offset impacts to tributary water quality. Restoration of the Las Vegas Wash wetlands will trap surface and groundwater contaminants, cool return flows and further improve the quality of return flows before it reaches Lake Mead.

3.5.3.3.2 Comparison of Baseline Conditions and Alternatives

Section 3.5.3.3.1, above, discussed the general water quality effects that may be expected given reduced Lake Mead surface elevations and volumes. The following sections compare predicted surface elevations, volume, and surface area of Lake Mead under baseline and alternative conditions. This analysis is based on system modeling

results; specifically the 50 percent (median) probability elevations, as shown on Figure 3.5-5.

Characteristics of Lake Mead (elevation, volume, surface area) under baseline and alternative conditions are shown below for four selected years (i.e., years 2016, 2026, 2036 and 2050) within the modeled period, as shown in Table 3.5-6. A comparison of the percentage difference between the alternatives and baseline conditions is shown in Table 3.5-7. It should be noted that median elevations converge with the baseline condition towards the end of the period of analysis, resulting in minimal differences among the alternatives and baseline conditions in the year 2050.

3.5.3.3.2.1 Baseline Conditions

Baseline projections indicate a general trend of decreasing Lake Mead surface elevations, volume and surface area over the period of analysis, as shown above on Figure 3.5-5 and in Table 3.5-4. At the end of the interim surplus criteria period, 2016, the median elevation for Lake Mead is 1162 feet msl, a reduction of 15 feet from the surface elevation in 2002. The median baseline elevation in 2050 is 1111 feet msl for a total reduction in the median elevation of 76 feet over the entire period of analysis. This increased potential for lake level reductions would be expected to result in an increased potential for declining water quality of Lake Mead and associated effects on the SNWA intake (discussed in Section 3.5.3.3.1, above) over time under baseline conditions.

3.5.3.3.2.2 Basin States Alternative

Modeling of the Basin States Alternative indicates intermediate reductions in surface elevations, surface area and volume compared with baseline conditions in the year 2016 (when the largest differences among the alternatives are seen). The median elevation in year 2016 under the Basin States Alternative is 1143 feet msl, or 1.6 percent lower than baseline conditions in the same year, with reservoir volume approximate 12 percent lower than baseline conditions and volume becoming slightly greater than baseline by the year 2026 and slightly less than baseline in 2036. By the year 2050 no differences between this alternative and baseline conditions are present.

Table 3.5-6
Modeled Characteristics of Lake Mead Under Baseline and Alternative Conditions

Alternative	Elevation[1] (feet above msl)				Volume (maf)				Surface Area (x 1000 acres)			
	2016	2026	2036	2050	2016	2026	2036	2050	2016	2026	2036	2050
Baseline Conditions	1162.1	1125.7	1120.7	1110.6	17.9	13.9	13.4	12.5	120.2	99.8	97.6	93.6
Basin States	1143.3	1124.7	1120.4	1110.6	15.8	13.8	13.4	12.5	108.1	99.3	97.4	93.6
Flood Control	1162.1	1128.0	1118.9	1110.6	17.9	14.1	13.2	12.5	120.2	100.7	96.8	93.6
Six States	1145.5	1124.7	1120.5	1110.6	16.0	13.8	13.4	12.5	109.4	99.3	97.5	93.6
California	1131.2	1116.4	1117.6	1110.6	14.5	13.0	13.1	12.5	102.1	95.9	96.3	93.6
Shortage Protection	1130.2	1117.9	1117.6	1110.6	14.4	13.2	13.1	12.5	101.7	96.5	96.3	93.6

[1] Values shown are median elevations (50th percentile) for each year group.

Table 3.5-7
Modeled Comparisons of Alternatives to Baseline Conditions

Alternative	Elevation Change				Volume Change				Surface Area Change			
	2016	2026	2036	2050	2016	2026	2036	2050	2016	2026	2036	2050
Basin States	-1.6%	-0.1%	0.00%	0.00%	-11.7%	-0.7%	0.00%	0.00%	-10.1	-0.5	-0.2	0.00%
Flood Control	0.00%	0.2%	-0.2%	0.00%	0.00%	1.4%	-1.5%	0.00%	0.00%	0.9%	-0.8%	0.00%
Six States	-1.4%	-0.1%	0.00%	0.00%	-10.6%	-0.7%	0.00%	0.00%	-9.0%	-0.5%	-0.2%	0.00%
California	-2.7%	-0.8%	-0.3%	0.00%	-19.0%	-6.5%	-2.2%	0.00%	-15.1%	-3.9%	-1.3%	0.00%
Shortage Protection	-2.7%	-0.7%	-0.3%	0.00%	-19.6%	-5.0%	-2.2%	0.00%	-15.4%	-3.3%	-1.3%	0.00%

3.5.3.3.2.3 Baseline Conditions

Baseline projections indicate a general trend of decreasing Lake Mead surface elevations, volume and surface area over the period of analysis, as shown above on Figure 3.5-5 and in Table 3.5-4. At the end of the interim surplus criteria period, 2016, the median elevation for Lake Mead is 1162 feet msl, a reduction of 15 feet from the surface elevation in 2002. The median baseline elevation in 2050 is 1111 feet msl for a total reduction in the median elevation of 76 feet over the entire period of analysis. This increased potential for lake level reductions would be expected to result in an increased potential for declining water quality of Lake Mead and associated effects on the SNWA intake (discussed in Section 3.5.3.3.1, above) over time under baseline conditions.

3.5.3.3.2.4 Basin States Alternative

Modeling of the Basin States Alternative indicates intermediate reductions in surface elevations, surface area and volume compared with baseline conditions in the year 2016 (when the largest differences among the alternatives are seen). The median elevation in year 2016 under the Basin States Alternative is 1143 feet msl, or 1.6 percent lower than baseline conditions in the same year, with reservoir volume approximate 12 percent lower than baseline conditions and volume becoming slightly greater than baseline by the year 2026 and slightly less than baseline in 2036. By the year 2050 no differences between this alternative and baseline conditions are present.

3.5.3.3.2.5 Flood Control Alternative

Modeling of the Flood Control Alternative produces similar surface elevations, surface area, and volume compared with baseline conditions in the year 2016, with the elevation, surface area and volume becoming slightly greater then baseline by the year 2026 and slightly less than baseline in 2036. By the year 2050 no differences between this alternative and baseline conditions are present.

3.5.3.3.2.6 Six States Alternative

Modeling of the Six States Alternative indicates a Lake Mead surface elevation 1.4 percent lower and a volume 10.6 percent lower than baseline conditions in 2016. By the year 2026 and for the remaining period of analysis, differences between baseline conditions and this alternative are within one percent.

3.5.3.3.2.7 California Alternative

Modeling of the California Alternative indicates a volume of Lake Mead in the year 2016 that is 19 percent lower than baseline conditions, with the difference decreasing to 6.5 percent and 2.2 percent in the years 2026 and 2036, respectively.

3.5.3.3.2.8 Shortage Protection Alternative

Modeling of the Shortage Protection Alternative indicates similar changes in volume reduction as the California Alternative throughout the period of analysis, with volume 19.6 percent lower than baseline conditions in 2016, 6.5 percent lower in 2026 and 2.2 percent lower in 2036.

3.5.3.3.2.9 Summary of Changes in Lake Mead Volume and Elevation

Tables 3.5-6 and 3.5-7 summarize modeled changes in Lake Mead surface elevation, area, and volume under each of the alternatives as compared with baseline conditions. With the exception of the Flood Control Alternative, each of the alternatives indicate an increase potential for lower surface elevations, surface area and lake volume. These difference are most pronounced in year 2016, the end of the interim surplus criteria period. The greatest differences compared with baseline conditions are associated with the California and Shortage Protection alternatives, with intermediate differences indicated by the Basin States and Six States alternatives.

3.5.4 WATER QUALITY BETWEEN HOOVER DAM AND SOUTHERLY INTERNATIONAL BOUNDARY

There have been concerns from the EPA and others about contaminants in the Lower Colorado River between Hoover Dam and the SIB. However, there is little site specific data from this segment of the river. A USGS (1995) study of mercury and other contaminants found in fish and wildlife located in the Yuma Valley area concluded that mercury is not a problem.

The above study also indicates that selenium is also not a problem for fish and wildlife. Selenium in Colorado River water in the Yuma Valley had a median value of less than one micrograms per liter (µg/l). This research also confirms what other previous selenium studies have concluded: selenium in the LCR and its biota remains below the DOI level of concern of five µg/l. A 1986-1987 study by the USGS indicated a finding of 3.4 µg/l or less for dissolved selenium at several sites in the Lower Colorado River (USGS, 1988). Department of Interior's Pre-reconnaissance Investigation Guides (1992) reported similar findings of less than 3.4 µg/l in Colorado River water at Pilot Knob. In the 1995 USGS study of the Yuma area, measured selenium in 18 water samples averaged 1.72 µg/l, with a maximum of 8.0 µg/l and a minimum of less than 1.0 µg/l. Nine of the 18 measurement results were reported to be less than 1.0 µg/l. Currently there are no state fish consumption advisories for mercury, selenium or any other contaminants on the Lower Colorado River (Ketinger, 2000). Water quality studies will continue in this segment of the river during the 15-year period of proposed interim surplus criteria. None of the action alternatives are anticipated to increase concentrations of contaminants beyond the noted limits.

3.6 RIVERFLOW ISSUES

3.6.1 INTRODUCTION

This section considers the potential effects of interim surplus criteria on three types of releases from Glen Canyon Dam and Hoover Dam. The Glen Canyon Dam releases analyzed are those needed for restoration of beaches and habitat along the Colorado River between the Glen Canyon Dam and Lake Mead, and for a yet to be defined program of low steady summer flows to be provided for the study and recovery of endangered Colorado River fish, in years when releases from the dam are near the minimum. The Hoover Dam releases analyzed are the frequency of flood releases from the dam and the effect of flood flows along the river downstream of Hoover Dam.

3.6.2 BEACH/HABITAT-BUILDING FLOWS

The construction and operation of Glen Canyon Dam has caused two major changes related to sediment resources downstream in Glen Canyon and Grand Canyon. The first is reduced sediment supply. Because the dam traps virtually all of the incoming sediment from the Upper Basin in Lake Powell, the Colorado River is now released from the dam as clear water. The second major change is the reduction in the high water zone from the level of pre-dam annual floods to the level of powerplant releases. Thus, the height of annual sediment deposition and erosion has been reduced.

During the investigations leading to the preparation of the *Operation of Glen Canyon Dam Final EIS* (Reclamation, 1995b), the relationships between releases from the dam and downstream sedimentation processes were brought sharply into focus, and flow patterns designed to conserve sediment for building beaches and habitat (i.e., beach/habitat-building flow, or BHBF releases) were identified. The BHBF releases are scheduled high releases of short duration that exceed the hydraulic capacity of the powerplant. Such releases were presented as a commitment in the ROD (Reclamation, 1996e) for the *Operation of the Glen Canyon Dam FEIS*, at a then-assumed frequency of one in five years.

In addition to the BHBF releases described above that exceed the hydraulic capacity of the Glen Canyon Powerplant, the *Operation of Glen Canyon Dam FEIS* identified the need for Beach/Habitat Maintenance Flow releases which do not exceed the hydraulic capacity of the powerplant. These flows were designed to prevent backwater habitat from filling with sediment and to reduce vegetation on camping beaches in years between BHBFs. BHBF releases and Beach/Habitat Maintenance Flows serve as a tool for maintaining a mass balance of sediment in Glen Canyon and Grand Canyon.

3.6.2.1 METHODOLOGY

The frequencies at which BHBF releases from Glen Canyon Dam would occur under baseline conditions and under operation of the interim surplus criteria alternatives were estimated through the use of modeling as described in Section 3.3.

The model was configured to simulate BHBF releases by incorporating the BHBF triggering criteria (contained in Section 3.6.2.2) into the Glen Canyon Dam operating rules. The model was also configured to make no more than one BHBF release in any given year.

3.6.2.2 AFFECTED ENVIRONMENT

Sediment along the Colorado River below Glen Canyon Dam is an important and dynamic resource which affects fish and wildlife habitat along the river, creates camping beaches for recreation, and serves to protect cultural resources. Except for remnants of high river terraces deposited prior to the closure of Glen Canyon Dam, the now limited sediment supply that exists along the river channel is affected by dam operations.

Since construction of Glen Canyon Dam, the measured suspended sediment load (sand, silt, and clay) at Phantom Ranch (in the Grand Canyon) averages 91 million tons per year. Most of this load comes from the Paria River and the Little Colorado River. Flash floods from other side canyons also contribute to the sediment supply (Reclamation, 1995b). The suspended sediment load is sporadic in occurrence, depending on Glen Canyon Dam releases and tributary inputs.

Beneficial sediment mobilization and deposition below Glen Canyon Dam depends on the interaction of two occurrences for full effectiveness: the addition of sediment to the river corridor and BHBF releases. The higher energy of BHBF releases mobilizes suspended and riverbed-stored sand and deposits it as beaches in beach and shoreline areas. Once a BHBF release has been made, additional sediment supply from tributary inflows is needed before subsequent BHBF releases are fully effective in promoting further beach and sandbar deposition along the river.

Subsequent to the ROD cited above, the representatives of the AMP further refined specific criteria under which BHBFs would be made. The criteria provide that under the following two triggering conditions, BHBF releases may be made from Glen Canyon Dam:

1. If the January forecast for the January-July unregulated spring runoff into Lake Powell exceeds 13 maf (about 140 percent of normal) when January 1 content is greater than 21.5 maf; or
2. Any time a Lake Powell inflow forecast would require a monthly powerplant release greater than 1.5 maf.

Research concerning the relationships among dam operations, downstream sediment inflow, river channel and sandbar characteristics, and particle-size distribution along the river is ongoing.

3.6.2.3 ENVIRONMENTAL CONSEQUENCES

The effects of the interim surplus criteria alternatives on BHBF releases from Glen Canyon Dam were analyzed in terms of the yearly frequency at which BHBF releases could be made. Specifically, the frequency was indicated by the occurrence of one or both of the triggering criteria cited above, during a calendar year. The following discussion presents probability of occurrence under baseline conditions, and then compares the probability of BHBF releases under each interim surplus criteria alternative with the baseline conditions.

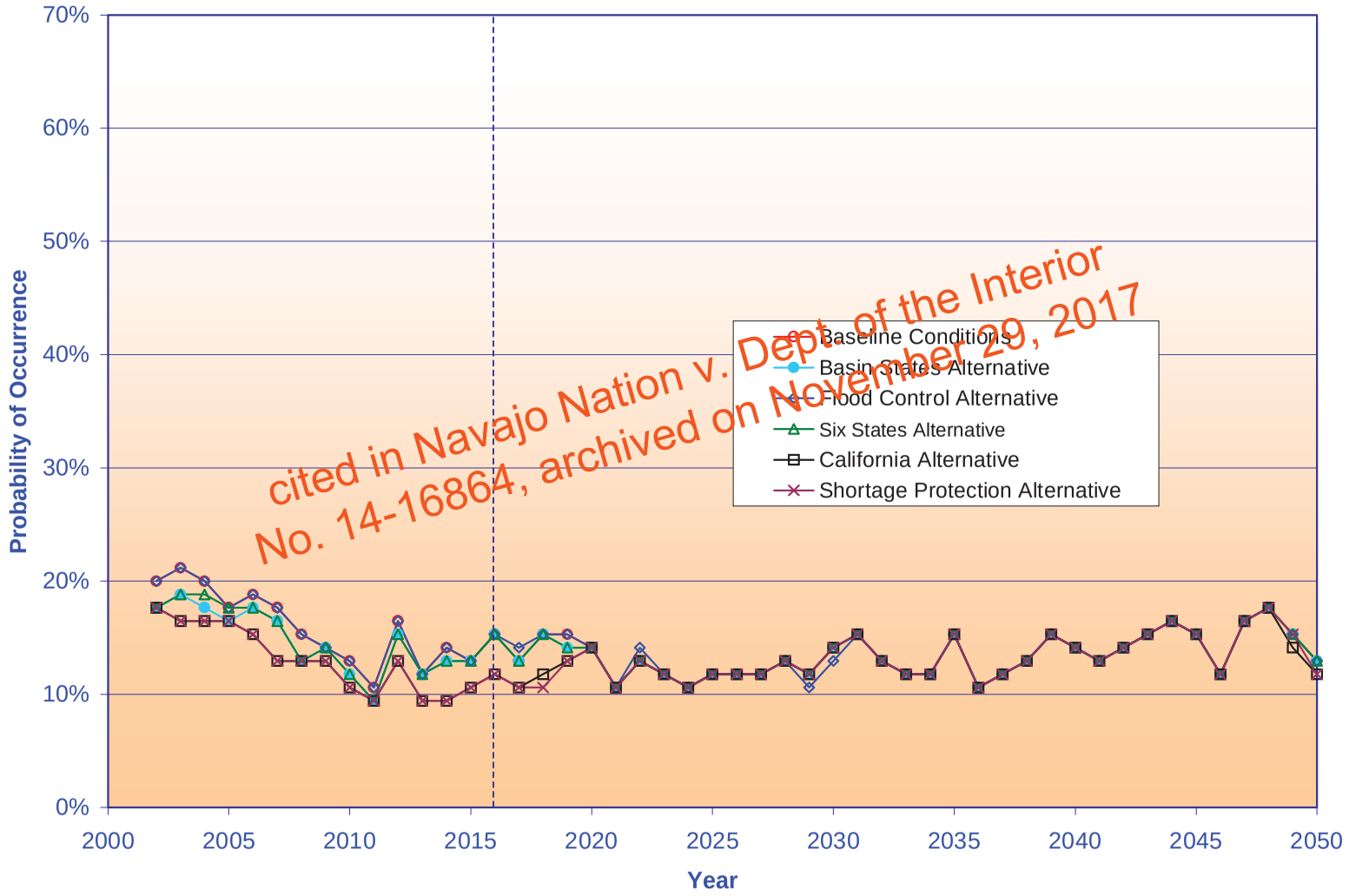
Figure 3.6-1 shows the probabilities that BHBF releases could be made under baseline conditions and the action alternatives. The plots show that the probabilities will decrease over the first decade to an irregular range of approximately 10 to 15 percent or lower, which is maintained until a slight rising trend appears in the last 15 years of the period of analysis. The trends result from the interaction of various factors, including projected increases in depletions by the Upper Division states and the requirements for equalization of storage in Lakes Powell and Mead. The operational parameter most directly comparable to the plotted relationships is the future median water level of Lake Powell. As can be seen on Figure 3.3-6, the median level of the reservoir is projected to recover somewhat in the last 15 years of the period of analysis. This correlates to the slight rise in BHBF release probabilities in the final 15 years.

Table 3.6-1 summarizes the BHBF release probabilities during the interim period and the subsequent period to 2050, based on the data plotted in Figure 3.6-1. The table reflects the higher average probability during the interim period than during the succeeding period ending in 2050.

Table 3.6-1
Probabilities of BHBF Releases from Glen Canyon Dam

Period	Percent of Time That Conditions Needed for BHBF Releases Would Occur at Lake Powell					
	Baseline Condition	Basin States Alternative	Flood Control Alternative	Six States Alternative	California Alternative	Shortage Protection Alternative
Through 2016	15.9%	14.8%	15.9%	14.9%	13.0%	13.0%
2017-2050	13.5%	13.4%	13.5%	13.4%	13.2%	13.2%

Figure 3.6-1
Lake Powell Releases
Probability of Occurrence of BHBF Flows



3.6.2.3.1 Baseline Conditions

During the interim period, the average probability under baseline conditions that BHBF releases could be made in a given year is approximately 15.9 percent, which is equivalent to about one year in six. During the subsequent period ending in 2050, the average probability is approximately 13.5 percent, which is equivalent to about one year in seven. The reduction in probability after 2015 under baseline conditions results from the fact that with time, the Lake Powell water level will probably decline because of increased Upper Basin depletions, as illustrated in Section 3.3. This water level decline would gradually reduce the probability that the BHBF triggering criteria would occur.

3.6.2.3.2 Basin States Alternative

During the interim period, the average probability under the Basin States Alternative that BHBF releases could be made in any single year is approximately 14.8 percent, which equates to approximately one year in seven. During the subsequent period ending in 2050, the average probability is approximately 13.4 percent, which is equivalent to about one year in seven.

3.6.2.3.3 Flood Control Alternative

During the interim period, the average probability under the Flood Control Alternative that BHBF releases could be made in any single year is approximately 15.9 percent, which equates to approximately one year in six. During the subsequent period ending in 2050, the average probability is approximately 13.5 percent, which is equivalent to about one year in seven.

3.6.2.3.4 Six States Alternative

During the interim period, the average probability under the Six States Alternative that BHBF releases could be made in any single year is approximately 14.9 percent, which equates to approximately one year in seven. During the subsequent period ending in 2050, the average probability is approximately 13.4 percent, which is equivalent to about one year in seven.

3.6.2.3.5 California Alternative

During the interim period, the average probability under the California Alternative that BHBF releases could be made in any single year is approximately 13.0 percent, which equates to approximately one year in eight. During the subsequent period ending in 2050, the average probability is approximately 13.2 percent, which is equivalent to about one year in eight.

3.6.2.3.6 Shortage Protection Alternative

During the interim period, the average probability under the Shortage Protection Alternative that BHBF releases could be made in any single year is approximately 13.0 percent, which equates to approximately one year in eight. During the subsequent period ending in 2050, the average probability is approximately 13.2 percent, which is equivalent to about one year in eight.

3.6.3 LOW STEADY SUMMER FLOW

3.6.3.1 AFFECTED ENVIRONMENT

During preparation of the *Operation of Glen Canyon Dam FEIS*, it was hypothesized that steady flows with a seasonal pattern may have a beneficial effect on the potential recovery of special status fish species down stream of Glen Canyon Dam. Accordingly, development of an experimental water release strategy was recommended by the Service to achieve steady flows when compatible with water supply conditions and the requirements of other resources. The strategy included developing and verifying a yet to be defined program of experimental flows which would include providing high steady flows in the spring and low steady flows in summer and fall during water years when a volume of approximately 8.23 maf is released from Glen Canyon Dam. This strategy, commonly referred to as the low steady summer flow program, was contained in the *Final Biological Opinion on the Operation of Glen Canyon Dam* (Service, December 1994c), and recognized in the ROD for the *Operation of Glen Canyon Dam FEIS* (USDI, 1996).

3.6.3.2 ENVIRONMENTAL CONSEQUENCES

The ability to test the low steady summer flow release strategy at Glen Canyon Dam according to the ROD could be affected by the implementation of interim surplus criteria. This matter was investigated by analyzing the model releases from Glen Canyon Dam to determine the probabilities at which minimum releases of 8.23 maf per water year would occur.

Figure 3.6-2 shows the annual probabilities of minimum releases from Glen Canyon Dam during the period of analysis. Note that the first year plotted is 2003, since 2003 would be the first complete water year (October 1, 2002 through September 30, 2003) during the interim period. The plots show that the probabilities increase through 2023, from approximately 20 to 25 percent to approximately 60 percent, which is maintained until another increase to 67 percent occurs during the last 15 years of the analysis. The trends result from the interaction of various factors that affect annual releases from Glen Canyon Dam, including projected increases in depletions by the Upper Division states and the requirements for equalization of storage in Lakes Powell and Mead.

Figure 3.6-2
Lake Powell Releases
Probability of Approximately 8.23 maf Annual Release

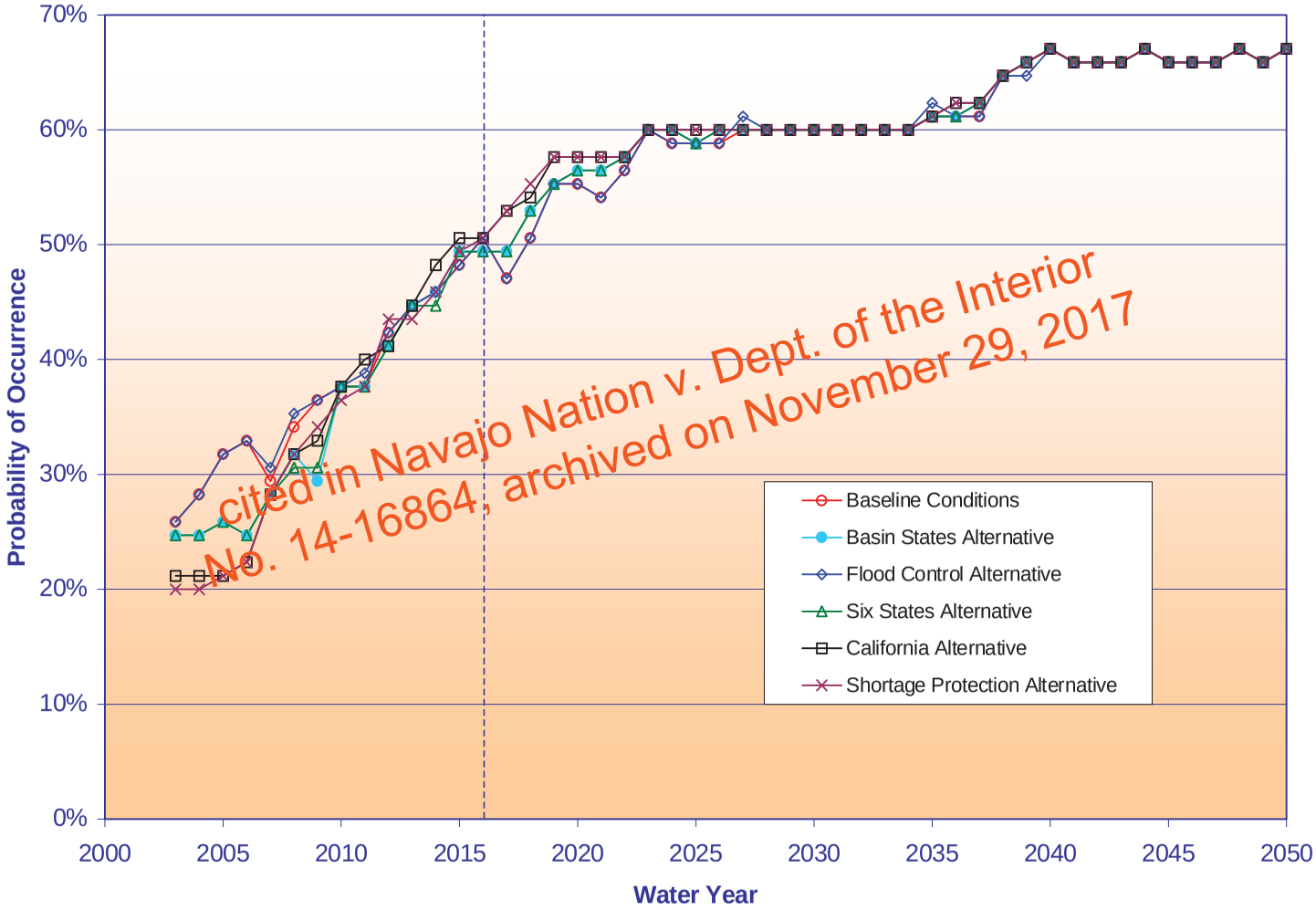


Table 3.6-2 summarizes the probabilities that minimum releases would occur during the interim period and the subsequent period to 2050, based on data plotted in Figure 3.6-2. Probabilities are summarized by water year because releases from Glen Canyon Dam are accounted for by water year under provisions of the LROC. The results indicate that under baseline conditions, the probability of 8.23 maf annual releases from the dam is approximately 38.2 percent during the interim period and 61.6 percent during the subsequent period ending in 2050. The probabilities under all alternatives are similar to those under baseline conditions after 2006. Under the Flood Control Alternative, the probability is approximately the same as for baseline conditions, as shown on Table 3.6-2. The probabilities under the remaining four interim surplus criteria alternatives during the interim period are one to two percent less than under baseline conditions. During the subsequent period through 2050, the probabilities resulting from the remaining four surplus criteria would be one to two percent higher than under baseline conditions.

Table 3.6-2
Probability of Minimum Glen Canyon Dam Releases
(Annual Releases of 8.23 maf)

Period (Water Years)	Baseline Condition	Basin States Alternative	Flood Control Alternative	Six States Alternative	California Alternative	Shortage Protection Alternative
Through 2016	38.2%	36.3%	38.4%	36.2%	35.8%	36.3%
2017-2050	61.6%	61.9%	61.6%	61.9%	62.2%	62.1%

Note: The "water year" on which this accounting is based extends from October 1 to September 30.

3.6.4 FLOODING DOWNSTREAM OF HOOVER DAM

Under the BCPA, flood control was specified as the project purpose having first priority for the operation of Hoover Dam. Subsequently, Section 7 of the Flood Control Act of 1944 established that the Secretary of War (now the Corps) will prescribe regulations for flood control for projects authorized, wholly or in part, for such purposes.

The Los Angeles District of the Corps published the current flood control regulations in the *Water Control Manual for Flood Control, Hoover Dam and Lake Mead Colorado River, Nevada and Arizona* (Water Control Manual) dated December 1982. The Field Working Agreement between Corps and Reclamation for the flood control operation of Hoover Dam and Lake Mead, as prescribed by the Water Control Manual, was signed on February 8, 1984. The flood control plan is the result of a coordinated effort between the Corps and Reclamation; however, the Corps is responsible for providing the flood control regulations and has authority for final approval. The Secretary is responsible for operating Hoover Dam in accordance with these regulations. Any deviation from the flood control operating instructions must be authorized by the Corps.

This analysis addresses the flooding that occurs along the Colorado River below Hoover Dam. The evaluation focuses on the change in the probability that various "threshold" flows would be released from Hoover, Davis and Parker Dams. A threshold flow rate is one at which flood damages have been found to begin to occur along the river. The analysis is not limited to dam releases made expressly in connection with flood control operation, but also includes releases made for water supply and power generation purposes. For example, power generation requirements can cause releases from Hoover Dam to exceed 19,000 cfs, with such releases being regulated in Lake Mohave downstream. In addition, the analysis presents data on land use and anticipated flood damages that were developed by the Los Angeles District Corps of Engineers in the *Review of Flood Control Regulations, Colorado River Basin, Hoover Dam, July 1982* (Corps, 1982).

3.6.4.1 AFFECTED ENVIRONMENT

Historical flows downstream of Hoover Dam have caused flood damages at various points along the lower Colorado River. A key threshold level was established as a result of flooding that occurred in 1983 when uncontrolled releases occurred over the Hoover Dam spillways. The high Colorado River flows caused damages primarily to encroachments in the Colorado River floodplain. In addition, several lower thresholds that are significant along various reaches are evaluated in the following subsections.

The Colorado River Floodway Protection Act (Floodway Act) originated from Congressional hearings held in 1983 following the flood. The Floodway Act called for the establishment of a federally declared floodway from Davis Dam to the SIB. The floodway is to accommodate either a 1-in-100 year river flow consisting of controlled releases and tributary inflow, or a flow of 40,000 cfs, whichever is greater. As discussed in Section 3.3.1, certain flood release rates from Hoover Dam are required depending on flood flow into Lake Mead and the amount of available storage space.

Estimates of development in the flood plains below Hoover Dam were last made by the Corps based on 1979 data (Corps, 1982). These data are presented in Table 3.6-3.

3.6.4.1.1 Hoover Dam to Davis Dam

Critical flood flows for the reach between Hoover Dam and Davis Dam are 19,000 cfs, 28,000 cfs, 35,000 cfs, 43,000 cfs, and 73,000 cfs.

3.6.4.1.2 Davis Dam to Parker Dam

The river is within levees for most of the reach from Davis Dam to Parker Dam. Historical flood flows have caused damage to some of the bank protection. Minor damage begins to occur at flows of 26,000 cfs.

Table 3.6-3
Development in Flood Plains Between Hoover Dam and SIB, 1979 Data[1]

	(Number of structures unless otherwise noted)					
Flood Flow (cfs)	Mobile Homes	Residential	Commercial/ Industrial	Public/ Semipublic	Agriculture (acres)	Recreation Facilities [5]
100,000	1,609	1,457	74	70	55,089	278
71,000 [2]	758	786	54	66	15,861	277
48,000[3]	164	198	13	10	2,671	277
38,000[4]	101	138	4	6	176	232
28,000	17	44	1	0	90	201

[1] Corps of Engineers, Colorado River Basin Hoover Dam, Review of Flood Control Regulations. Final Report, July 1982. Table C-1.
[2] 78,000 cfs at Needles.
[3] 50,000 cfs at Needles.
[4] 40,000 cfs at Needles.
[5] Recreation facilities are primarily boat docks that would sustain significant damage with high flows.

3.6.4.1.3 Hoover Dam to Davis Dam

Critical flood flows for the reach between Hoover Dam and Davis Dam are 19,000 cfs, 28,000 cfs, 35,000 cfs, 43,000 cfs, and 73,000 cfs.

3.6.4.1.4 Davis Dam to Parker Dam

The river is within levees for most of the reach from Davis Dam to Parker Dam. Historical flood flows have caused damage to some of the bank protection. Minor damage begins to occur at flows of 26,000 cfs.

3.6.4.1.5 Parker Dam to Laguna Dam

Below Parker Dam, significant damage to permanent homes has occurred during releases within the flood operation criteria. This area has been further developed since the flood operations in 1983. Minor damage begins at 19,000 cfs along the Parker Strip (the reach of river between Parker Dam and the town of Parker, Arizona). Backwater regions, which function as wildlife refuges and recreational areas, accumulated sediment, and in some cases, became isolated from the Colorado River. Historical flood flows have also resulted in damage to infrastructure of government agencies.

3.6.4.1.6 Laguna Dam to SIB

Below Laguna Dam, the banks of the Colorado River are not protected. Historical flood flows have resulted in significant damage to the banks. Associated increases of groundwater level in the Yuma area have also resulted in some lands becoming water logged and caused drains to cease functioning. During the scoping process for this

DEIS, a letter from the Yuma County Water Users' Association states that "[o]ur landowners are harmed by such releases, particularly should the flood control releases be required to go beyond the 19,000 cubic feet per second Hoover release level" (Pope, 1999). The letter indicates that a flood control release of 28,000 cfs or greater could result in upwards of $200 million in damages to the Yuma area. Other injured parties could include the City of Yuma, the County of Yuma, Cocopah Indian Tribe, the Gila Valley, Bard Irrigation District, and the Quechan Indian Tribe.

Additional flows of concern include:

- Laguna Dam south to Pilot Knob: 9,000 cfs is the threshold value. Flows of 10,000 cfs to 11,000 cfs impact leach fields of trailer parks located within levees.

- Pilot Knob to SIB: 15,000 cfs is a threshold value. Above that level, high groundwater, localized crop damage and damage to the United States Bypass Drain occur.

3.6.4.2 ENVIRONMENTAL CONSEQUENCES

The effects of the interim surplus criteria on flood flows were analyzed by determining the probabilities that releases from Davis and Parker Dams would reach or exceed certain flow rates that have been found to be thresholds for damages. In addition, the analysis addressed the probabilities that releases of various magnitudes would be made from Hoover Dam corresponding to the required flood control releases discussed in Section 3.3.1.2, Operation of Hoover Dam. The release probabilities were determined from results of river system modeling described in Section 3.3. The results of the analysis are shown in Table 3.6-4.

The results portrayed on Table 3.6.3 show that except for the Flood Control Alternative, the action alternatives would reduce the probability of flows at or above the damage thresholds.

The Corps estimated the likely damage to development based on the 1979 land use data (Corps, 1982). These data are presented in Table 3.6-5.

The data on direct, physical damages presented in Table 3.6-5 are based on simultaneous flooding along all reaches of the river from Hoover Dam to the SIB. The data show that damages increase much more rapidly than the size of the flow. For example, a 48,000-cfs flow has 15 times the impact of a 22,000-cfs flow, while the flow increases by only 2.2 times. A 48,000 cfs flow has a less than one-in-500 probability of occurring in any one year, while a 22,000 cfs flow has a greater than one-in-20 probability of occurring in any one year under all alternatives.

Table 3.6-4
Discharge Probabilities from Hoover, Davis and Parker Dams

Release Point	Discharge (cfs)[1]	Percent of Years With Flows Greater Than or Equal to Discharge					
		Baseline Conditions	Basin States Alternative	Flood Control Alternative	California Alternative	Six States Alternative	Shortage Protection Alternative
Years 2002 to 2016							
Hoover Dam	19,000	20.8	18.8	21.2	16.3	18.6	16.9
Hoover Dam	28,000	7.5	7.2	7.7	5.5	7.1	5.8
Hoover Dam	35,000	2.1	2.0	2.1	1.6	2.0	1.7
Hoover Dam	40,000	0.2	0.2	0.2	0.2	0.2	0.2
Hoover Dam	73,000	0.0	0.0	0.0	0.0	0.0	0.0
Davis Dam	26,000	8.6	8.1	9.1	7.0	8.0	7.1
Parker Dam	19,500	10.4	9.4	11.3	7.8	9.3	8.0
Years 2017 to 2050							
Hoover Dam	19,000	14.6	14.1	14.9	13.9	14.1	13.8
Hoover Dam	28,000	4.0	3.8	4.2	3.7	3.8	3.6
Hoover Dam	35,000	0.9	1.7	0.9	0.8	0.9	0.8
Hoover Dam	40,000	0.2	0.1	0.2	0.1	0.2	0.1
Hoover Dam	73,000	0.0	0.0	0.0	0.0	0.0	0.0
Davis Dam	26,000	4.8	4.6	5.0	4.4	4.6	4.5
Parker Dam	19,500	5.9	5.7	6.1	5.6	5.7	5.6

[1] Average monthly discharge

Table 3.6-5
Estimated Flood Damages Between Hoover Dam and the SIB
(1979 level of development and 2000 price level[1])

Flood Flow (cfs)	Flood Damages
100,000	$201,000,000
71,000 [2]	$ 55,700,000
48,000[3]	$ 9,210,000
38,000[4]	$ 1,550,000
22,000	$ 610,000

[1] Corps of Engineers, Colorado River Basin Hoover Dam, Review of Flood Control Regulations. Final Report, July 1982. Table C-5. Adjusted from June 1978 to March 2000 price level by Consumer Price Index-all Urban Consumers. (June 1978 is 65.2, March 2000 is 167.8, Adjustment factor: 2.57.)

[2] 78,000 cfs at Needles

[3] 50,000 cfs at Needles

[4] 40,000 cfs at Needles

3.7 AQUATIC RESOURCES

3.7.1 INTRODUCTION

The analyses presented in this section consider two specific issues associated with aquatic resources. These issues are potential effects to Lake Mead and Lake Powell aquatic species habitat and potential effects to sport fisheries at Lake Powell, Lake Mead, and the Colorado River between Lake Powell and Lake Mead. The interim surplus criteria are not expected to result in any changes to aquatic resources below Hoover Dam.

3.7.2 LAKE HABITAT

The primary lake habitats identified for potential affect within the project area include Lake Powell and Lake Mead. Other reservoirs downstream of Lake Mead (Lake Mohave and Lake Havasu) are not expected to be affected by the proposed interim surplus criteria because operation of the system keeps lake levels at specified target elevations to facilitate power generation and water deliveries (Reclamation, 2000).

Native Colorado River fishes have not fared well in the reservoirs. Non-native fish species, which prey on and compete with native species, have become well-established in both lakes. While some native species may spawn within the reservoirs and others have young that drift into the lakes, predation and competition is believed to eliminate young native fish from the reservoirs and precludes their survival and recruitment. A discussion of native Colorado River fishes is presented in Section 3.8, Special-Status Species.

3.7.2.1 METHODOLOGY

Existing literature was reviewed to determine the historic and current status of fish assemblages in Lake Powell and Lake Mead. Literature reviewed included recent publications and draft documents on the operations at Lake Powell and Lake Mead, biological assessments, fish management plans, and biological opinions. Investigation into critical lake elevations, water quality, and temperature limits were made based on the fish species known to inhabit these lakes, including the use of these lakes by endangered species. Because no “threshold” lake elevations associated with significant adverse effects on lake habitat were identified for any of the fish species, the use of system modeling relied upon a comparison of general reservoir surface elevation trends under baseline conditions and the alternatives, shown in Figures 3.3-6 and 3.3-13. A qualitative analysis of potential lake habitat changes was made by comparing the differences between lake level trends under baseline conditions and the various alternatives.

3.7.2.2 AFFECTED ENVIRONMENT

3.7.2.2.1 Lake Powell

Aquatic habitat in Lake Powell is a result of the lake's physical and geographical characteristics. Lake Powell has a surface area of 255 square miles and contains up to 24.3 maf of active storage. At full pool, depth of the reservoir near the dam is 561 feet. The thermocline (the boundary layer between a strata of colder and warmer water) changes seasonally, but below approximately 150 feet deep, the cold hypolimnion (a low oxygen, low light, deep water layer of the lake) is consistently maintained due to thermal and chemical properties. Lake Powell exhibits a trophic gradient from the shallow productive inflows where nutrients and sediments are delivered by rivers, to the clear nutrient-poor water by the dam. As the reservoir gradually shallows moving away from the dam, the depth and extent of the thermocline and hypolimnion change. Lake elevations change from year to year depending on numerous factors, including Upper Basin runoff. The clear water reservoir offers habitat beneficial to non-native fish. Generally, the reservoir is oligotrophic (characterized by low dissolved nutrients and organic matter); deep, clear, and low in chlorophyll abundance (NPS, 1996).

Non-native fish species became established by intentional and unintentional introductions. Largemouth bass and crappie populations were stocked initially and subsequently proliferated to provide the bulk of the sport fisheries. Both species have declined in recent years due to lack of habitat structure for young fish. Filling, fluctuation, and aging of the reservoir resulted in changing habitat that eliminated most of the vegetation and favored different species. The habitat change led to the introduction of smallmouth bass and striped bass, presently the two dominant predator species in the reservoir, with striped bass being the most dominant. Threadfin shad were introduced to provide an additional forage base and quickly became the predominant prey species (NPS, 1996).

Other species common in Lake Powell include walleye, bluegill, green sunfish, carp and channel catfish. Species that occur in the reservoir, but that are mainly associated with tributaries and inflow, include fathead minnow, mosquitofish, red shiner and plains killifish (NPS, 1996). Table 3.7-1 lists fish species present in the project area.

Native fish species were displaced by habitat loss and alteration associated with construction and operation of mainstream dams and reservoirs, as well as competition with and predation by introduced non-native species. Bonytail is the native species believed to be in the most peril of imminent extinction because they are virtually eliminated in the Upper Basin. Bonytail were reported in Lake Powell soon after closure of Glen Canyon Dam; however, annual gill-net surveys conducted by the Utah Department of Wildlife Resources have failed to produce any bonytail in the last 20 years.

Table 3.7-1
Fish Species Present in the Project Area

Species	Scientific Name	Origin
Black bullhead	*Ictalurus melas*	Invading sport fish
Black crappie	*Pomoxis nigromaculatus*	Introduced sport fish
Bluegill	*Lepomis macrochirus*	Invading sport fish
Bluehead sucker	*Catastomus discobolus*	Native to Colorado River
Bonytail	*Gila elegans*	Native to Colorado River
Brown Trout	*Salmo trutta*	Introduced sport fish
Carp	*Cyprinus carpio*	Invading fish
Channel catfish	*Ictalurus punctatus*	Invading sport fish
Colorado pikeminnow	*Ptychocheilus lucius*	Native to Colorado River
Fathead minnow	*Pimephales promelas*	Invading forage fish
Flannelmouth sucker	*Catostomus latipinnis*	Native to Colorado River
Green sunfish	*Lepomis cyanellus*	Invading fish
Humpback chub	*Gila cypha*	Native to Colorado River
Largemouth bass	*Micropterus salmoides*	Introduced sport fish
Mosquitofish	*Gambusia affinis*	Invading forage fish
Northern pike	*Esox lucius*	Invading sport fish
Rainbow trout	*Oncorhynchus mykiss*	Introduced sport fish
Razorback sucker	*Xyrauchen texanus*	Native to Colorado River
Red shiner	*Notropis lutrensis*	Invading forage fish
Roundtail chub	*Gila robusta*	Native to Colorado River
Smallmouth bass	*Micropterus dolomieui*	Introduced sport fish
Speckled dace	*Rhinichthys osculus*	Native to Colorado River
Spotted sculpin	*Cottus bairdi*	Native to Colorado River
Striped bass	*Morone saxatilis*	Introduced sport fish
Threadfin shad	*Dorosoma petenense*	Introduced forage fish
Walleye	*Stizostedion vitreum*	Invading sport fish

Other native species that may still persist in Lake Powell include the Colorado pikeminnow and humpback chub. Although there have been no reports of Colorado pikeminnow in the lake since 1977, they are believed to still inhabit the Colorado River inflow area. Very few humpback chub have been found in Lake Powell and it is presumed that they are not present in the lake at this time; however, unidentified chub species were collected by seines and light traps in the Colorado River inflow area (NPS, 1996). Small numbers of razorback suckers have persisted in Lake Powell since the closure of Glen Canyon Dam, occurring mainly near the inflow of the San Juan River. Flannelmouth suckers are probably the only native fish to inhabit the main body of Lake Powell in detectable numbers. However, there has been a declining trend in population size and reproductive recruitment has not been documented. Additional discussion of special-status fish species is included in Section 3.8.

3.7.2.2.2 Lake Mead

Lake Mead has a surface area of 245 square miles and a storage capacity of 26 maf. Over two-thirds of the volume of Lake Mead remains at 55°F (13°C) throughout the year, resulting in a constant, cool discharge at Hoover Dam (USBR, 1996d). At full pool, depth of the reservoir near the dam is approximately 550 feet. Because of its physical similarity to Lake Powell, the limnological characteristics of Lake Mead are also similar. The thermocline changes seasonally and a cold hypolimnion is consistently maintained due to thermal and chemical properties. Surface elevations change from year to year depending on numerous factors, including Upper Basin runoff. The clear water reservoir offers habitat beneficial to non-native fish.

Native fish species were displaced by habitat loss and alteration associated with construction and operation of mainstream dams and reservoirs, as well as competition and predation with introduced non-native species. Razorback sucker, federally listed as an endangered species, is the only native species that maintains a remnant population in Lake Mead (USBR, 1996a,b).

Non-native fish species became established by intentional and unintentional introductions. Introduced fish species found in Lake Mead include largemouth bass, striped bass, rainbow trout, channel catfish, crappie, threadfin shad and carp (USBR, 1996). Bonytail populations are supported by specific management activities designed to re-establish this species in Lake Mohave. Remnant populations of these species exist downstream of Lake Mead in Lake Mohave and Lake Havasu and groups such as the Native Fish Wok Group (NFWG) and Lake Havasu Fishery Improvement Project (HAVFISH) are currently engaged in activities conducted under Section 7(a)(l) of the ESA to aid in the conservation and recovery of these species in the lower Colorado River Basis (USBR, 1999).

Releases from Lake Mead are the predominant influence on inflows to two other reservoirs, Lake Mohave and Lake Havasu. Operations at Lake Mead typically keep lake elevations at the downstream reservoirs at specific target elevations to facilitate power generation and water deliveries. The operation of Lake Mohave through 2002 is anticipated to limit reservoir fluctuations as a measure to assure that potential impacts to razorback sucker will be minimized during the spawning season (USBR, 1996).

3.7.2.2.3 General Effects of Reservoir Operation

Lake habitat in both Lake Powell and Lake Mead consists primarily of deep, clear, open water habitats with a cold hypolimnion that is consistently maintained due to thermal and chemical properties. The habitat found in these lakes is drastically different from the riverine habitat that existed prior to the construction of the dams, and is more suitable for non-native species than native species. Non-native fish species were introduced into the lakes, and subsequently established naturally reproducing populations. Habitat changes resulting from fluctuating lake levels have favored

introduced species tolerant of the conditions and temperatures found in the lakes. These species are able to reproduce in the lakes and are not expected to be affected by fluctuating lake levels. In Lake Powell for example, striped bass have experienced "unprecedented natural reproduction and survival" that allowed them to become "the most numerous sport fish and dominate the fish community of Lake Powell" (NPS, 1996).

The ability of native species to adapt to the lake habitat is limited mainly by the decreased survival of eggs and the lack of recruitment of young individuals into the adult population. The primary reason for low recruitment of native fish is predation of eggs and young by the established populations of non-native species. In some cases, nutrition may also influence recruitment (Horn, June 2000).

3.7.2.3. ENVIRONMENTAL CONSEQUENCES

There are no specific "threshold" lake levels that are definitive for evaluation of potential impacts to lake habitat in Lake Powell or Lake Mead. Projections of Lake Powell and Lake Mead surface the elevations are discussed in Sections 3.3.4.2 and 3.3.4.4, respectively. These reservoirs will continue to be subjected to varying inflows and fluctuating surface elevations, primarily due to hydrologic conditions present in the watershed and increasing water use in the Upper Basin. Historically, reservoir conditions have resulted in lake habitat that is favorable to non-native species and unfavorable to native species. Because the projected declines in reservoir surface elevation in both Lake Powell and Lake Mead are within the normal operational range of fluctuations, they are not likely to result in substantial changes to lake habitat.

3.7.3 SPORT FISHERIES

This section considers potential effects of the interim surplus criteria alternatives on sport fisheries in Lake Powell, Lake Mead and below Hoover Dam. Potential effects on recreation associated with sport fisheries are discussed in Section 3.9.5.

The sport fishery within the Colorado River corridor from Glen Canyon Dam to Separation Canyon is not analyzed in detail in this FEIS because annual release patterns from Glen Canyon Dam are determined in accordance with the 1996 ROD and are monitored through the Glen Canyon Dam Adaptive Management Program. Through this process, the effects of dam operations on downstream resources, including sport fish, are monitored and studied. The results are used to formulate potential recommendations on refinements to dam operations, to ensure that the purposes of the Grand Canyon Protection Act are met.

The possibility of changes in river water temperature downstream of Hoover Dam was also investigated. Reclamation conducted an analysis predicting water temperatures downstream of Hoover Dam with a Lake Mead water surface elevation of 1120 feet msl and a steady release of 62,000 cfs (30 percent higher than powerplant capacity). Under

these conditions, the warmest temperature predicted was 58.5°F in late summer. The midsummer discharge temperature was predicted to be 58.5°F (Reclamation, 1991). Under actual conditions with a reservoir elevation of 1120 feet msl, however, maximum discharge would be equal to the powerplant capacity of 49,000 cfs. At this lesser flow, discharges would be cooler than the temperatures predicted in the analysis, since less discharge water would be drawn from the warm upper portion of the reservoir than at higher flows. Therefore, it is assumed that increases of release temperatures corresponding to the median decline of lake levels under baseline conditions and the action alternatives would result in temperatures less than those predicted in the 1981 analysis.

Staff from the Willow Beach Federal Fish Hatchery, located about 12 miles downstream of Hoover Dam, reported that over the long term, river water temperatures have typically ranged from 56°F to 58°F, with occasional lows of 54°F. Modeled Hoover Dam discharges are not significantly different from those during periods when water temperatures were measured by hatchery personnel. It is expected that the minor changes in river water temperature described above would not be expected to adversely affect fish populations or the sport fishery in the river below Hoover Dam. The hatchery rears both trout and native fish. For native species, the hatchery warms the river water with solar panels. The projected increase in river temperatures may be a benefit to the hatchery's native fish program. River temperatures are not addressed further in this section.

3.7.3.1 METHODOLOGY

Existing literature was reviewed to determine the historic and current status of sport fish assemblages in Lake Powell and Lake Mead. Literature reviewed included recent publications on the status of sportfishing in both reservoirs, along with a review of water quality data including limnological reports and journal articles for information on contaminants found within the lakes and in fish tissue. Potential effects on sport fisheries identified herein are based on the analysis of lake habitat discussed in Section 3.7.2. Potential effects on sport fisheries are based on model output showing general trends of reservoir surface elevations, river flow rates and temperature. No specific threshold elevations or flows are used in the analysis.

3.7.3.2 AFFECTED ENVIRONMENT

Currently, Lake Powell and Lake Mead provide habitat for numerous species of introduced (non-native) fish which support outstanding recreational sport fishing opportunities. The fish species present in the GCNRA are listed in Table 3.7-1.

A similar species assemblage exists for Lake Mead. The two most common sportfish species found in Lake Powell and Lake Mead are striped bass and largemouth bass.

3.7.3.2.1 Reservoir Sport Fisheries

The primary sport fisheries management challenge in the reservoirs is trying to stabilize a striped bass population that reproduces beyond the limits of available forage. As a result of unlimited striped bass reproduction, pelagic (open water) stocks of threadfin shad upon which they prey have been decimated. Decimation of the shad population then results in striped bass starvation. Reduction of striped bass numbers allows the shad population to rebound from adult stocks residing in turbid, thermal refuges where they are less vulnerable to striped bass predation. As shad reenter the pelagic zone in large numbers, they are subsequently eaten by young striped bass who grow rapidly, mature, and once again eliminate shad from the pelagic zone. This widely fluctuating predator-prey cycle occurred during the 1990s and still occurs today.

Threadfin shad in Lake Powell exist in the northernmost portion of their range. Lower lethal temperatures for shad are reported as 40°F to 41°F (4.5°C to 5°C). Shad currently survive winters where water temperatures consistently range near the lethal limit by seeking deep strata where the water temperature is warmer and stable. An additional temperature reduction of even 2°F (1.0°C) may remove the thermal refuge and result in loss of shad over winter. The absence of a pelagic forage fish would not eliminate striped bass, which now subsist on plankton for the first year or two of life, but would eventually result in a permanently stunted striped bass population without quality sport fishing value (NPS, 1996).

The sport fishery at Lake Mead has been managed in much the same manner as in Lake Powell and has resulted in many of the same management challenges. The introduction of threadfin shad as a forage species and striped bass as the main predator has produced similar interactions between the two species.

3.7.3.3 ENVIRONMENTAL CONSEQUENCES

3.7.3.3.1 Reservoir Sport Fisheries

The sport fishery in Lake Powell and Lake Mead is primarily based on the presence of striped bass. Other sport fish found in the lakes include largemouth bass, catfish and trout. Since the predator-prey relationship between striped bass and threadfin shad can result in large variations of the striped bass population, stabilizing the population of striped bass and maintaining the threadfin shad population is an ongoing challenge to sport fish management in the lakes.

Although the occurrence of prey base fluctuations is more directly related to striped bass populations, a thermal refuge for adult threadfin shad is critical. Under baseline conditions and each of the alternatives, the challenge of stabilizing striped bass and threadfin shad populations in the lakes will continue and may include the need to alter the size or catch limit of striped bass or planting of fish from hatchery stock. All of the other sport fish, with the possible exception of trout, are well-adapted to habitats found

in the lakes and are largely unaffected by fluctuating lake levels and water temperatures. Trout populations in the reservoirs are sustained by planting fish from hatchery stock.

3.7.3.3.2 Colorado River Sport Fisheries

The primary sport fish in the Colorado River between Glen Canyon Dam and the Lake Mead inflow is rainbow trout. Natural reproduction of rainbow trout in the Grand Canyon is dependent on cool water temperatures, access to tributaries for spawning and continued availability of suitable main stem habitat. These variables are directly related to patterns of flow releases from Lake Powell. Under baseline conditions and each of the alternatives, an increase in the temperature of water released from Glen Canyon Dam could occur if reservoir levels in Lake Powell fall below an elevation of 3590 feet msl. The probability of elevations below 3590 feet msl is limited to the 10 percentile rankings and is not projected to occur until approximately years 2018 to 2028. Water releases from Glen Canyon Dam are controlled by operating criteria contained in the 1996 ROD and are monitored for compliance with the Grand Canyon Protection Act through the Adaptive Management Program. As a result, Colorado River sport fisheries would not be affected by the interim surplus criteria alternatives.

3.8 SPECIAL-STATUS SPECIES

3.8.1 INTRODUCTION

This section identifies potential effects of proposed interim surplus criteria to aquatic and terrestrial species of concern and their habitat, from Lake Powell to the SIB. Potential impacts to special-status species in Mexico are discussed in Section 3.16, Transboundary Impacts. As discussed in Section 1.4, a considerable amount of information pertinent to this analysis is available from various documents prepared by Reclamation and the Service under NEPA and/or the ESA, and is incorporated by reference.

Special-status species are species that are listed, or are proposed for listing, as "threatened" or "endangered" under the federal ESA that may be present in the area affected by the proposed action, and also include species of special concern to states or other entities responsible for management of resources within the area of analysis. This section contains a discussion of the life history requirements of each species, followed by an analysis of potential impacts to the species and its habitat.

Reclamation is consulting with the Service (and NMFS) to meet its responsibilities under Section 7 of the ESA on the effects of the proposed action to federally listed species. Reclamation prepared a biological assessment (BA) which evaluates the potential effects on listed species which may occur in the area from the headwaters of Lake Mead to the SIB (Reclamation, 2000). Preliminary evaluation of the effects to listed species which may be present in the Colorado River corridor from Glen Canyon Dam to the headwaters of Lake Mead led to the conclusion that the interim surplus criteria would not affect any species. Therefore, this area was not addressed in the BA. Refinements to the model used to predict future operations of Glen Canyon Dam for this EIS indicated there would be a minor change in the frequency with which flows recommended by the 1994 biological opinion concerning operation of Glen Canyon Dam would be triggered. It was determined that this change may affect listed species. The results of this analysis were provided to the Service in a November 29, 2000 memorandum as supplemental information to the BA, which is included in Attachment S.

Potential impacts to special-status species occurring in Mexico are discussed separately in Section 3.16, Transboundary Impacts. Specifically, Section 3.16 considers the potential effects on the following species: desert pupfish, vaquita, totoaba, Southwestern willow flycatcher, Yuma clapper rail, yellow-billed cuckoo, California black rail, elf owl, Bell's vireo, and Clark's grebe. Although consultation on species occurring in Mexico may not, as a matter of law, be required by the ESA, Reclamation is also supplementing the BA to include information pertinent to federally listed species from this analysis.

3.8.2 METHODOLOGY

Information on the affected environment and special-status species that may occur in the analysis area was compiled based on review of the pertinent documents listed in Section 1.4, available published and unpublished literature, and through personal communication with agency resource specialists. Species' distribution, range and habitat requirements were reviewed. These requirements formed the basis for compiling an initial list of plant, wildlife and fish species to be considered.

This analysis first discusses vegetative communities that exist throughout the analysis area, from Lake Powell to the SIB. Potentially affected plant, wildlife and fish species are then determined by considering hydrologic requirements and other habitat elements important to the species, such as nesting or breeding habitat for birds and spawning and rearing areas for fish. Species that are not known to be present in the analysis area, do not depend on terrestrial or aquatic habitat associated with the area under consideration or have a hydrologic connection are addressed briefly and removed from further consideration. The analysis of effects to the remaining potentially affected plant, animal and fish species and their habitat follows the section on the affected environment.

3.8.3 AFFECTED ENVIRONMENT

Vegetative communities within the analysis area are discussed, based on if they are located alongside the reservoirs (lakeside habitat) or along the Colorado River (riverside habitat). The special-status species are then identified. The species are divided into three main categories: plants, wildlife and fish. Tables in this section list the species' common and scientific names and current status, and indicate if critical habitat has been federally designated. Following each table, the occurrence and requirements of the species is provided. Species that would not be affected by the interim surplus criteria are identified and removed from further analysis.

3.8.3.1 LAKE AND RIPARIAN HABITAT

A description of lakeside vegetation associated with Lake Powell and GCNRA is provided below, followed by a description of vegetation associated with Lake Mead and LMNRA (which includes Lake Mohave) and Lake Havasu. This section then describes riverside habitat along the Colorado River corridor from Separation Canyon to the Lake Mead delta and below Hoover Dam. Aquatic habitat is discussed in the previous section on Aquatic Resources (Section 3.7).

3.8.3.1.1 Lakeside Habitat

Riparian and marsh vegetation around Lake Powell and Lake Mead is extremely restricted because of the desert terrain that extends directly to the water's edge (Reclamation, 1999d), and the continuously fluctuating lake levels that precludes

establishment of vegetation. Tamarisk or salt cedar (*Tamarix ramosissima*), a non-native invasive shrub- to tree-like plant along the Lake Powell shoreline is still becoming established and has not yet formed stable ecosystems. These communities will probably attain some importance as insect and wildlife (particularly bird) habitat in the future, and already provide habitat for fish during high lake levels when the plants are inundated (NPS, 1987).

Small intermittent or seasonal streams occur in many of the side canyons of Lake Powell. Fluctuations in lake levels may result in standing water in these side canyons where riparian vegetation has become established. Dominant plants found in these canyons include Fremont cottonwood (*Populus fremontii*), tamarisk, and cattail (*Typha* sp.) (NPS, undated b). The vegetation within these side canyons has been altered by the lake itself as a result of periodic inundation in association with fluctuating lake levels. In areas where there are springs and seeps, cattail marshes may be found. The most serious adverse influence on canyon and spring riparian zones associated with intermittent or seasonal streams in the side canyons of Lake Powell is domestic and feral livestock use (NPS, 1987).

The GCNRA also has many springs, seeps that are common in alcoves along the canyon walls, and waterpockets located in canyons and uplands. These areas are recognized for their significance as wetland habitats and as unique ecosystems within the desert (NPS, 1987).

The seeps that are common in alcoves along the walls of the canyon support hanging gardens. Hanging gardens are a specialized vegetation type and have a unique flora associated with them. The water sources that support hanging gardens originate from natural springs and seeps within the Navajo sandstone formation and are independent of Lake Powell. This plant community is found at various elevations around Lake Powell and is typically not affected by reservoir fluctuations. GCNRA hanging gardens are characterized by Eastwood monkeyflower (*Mimulus eastwoodiae*), alcove columbine (*Aquilegia micrantha*), Rydberg's thistle (*Cirsium rydbergii*) and alcove primrose (*Primula specuicola*). None of these are special-status species at this time, although all four are endemic to the Colorado Plateau. Maidenhair fern (*Adiantum* sp.) is the most typical species in hanging gardens throughout the Plateau (Spence, 1992). Other species typically associated with hanging gardens include maidenhair fern, golden columbine (*Aquilegia chrysantha*) and scarlet monkeyflower (*Mimulus cardinalis*).

The highest concentration of habitat associated with Lake Mead in the LMNRA is found in the Lake Mead and Virgin River deltas. Linear riparian woodlands may be present along the shoreline of the Lake Mead delta following high water flows, and associated sediment deposition and exposure. The sediment deposition and the associated growth of riparian vegetation at the Lake Mead delta has occurred for decades (McKernan, 1997). When lake levels decline, vegetation in the Lake Mead and Virgin River deltas begins to establish on clay/silt deposits. The dynamic nature of fluctuating lake levels and deposition of sediment in the Lake Mead delta is expressed

as a change in plant species composition and relative abundance over time. In 1963, tamarisk was the dominant tree species in the Lake Mead delta (McKernan, 1997). In 1996, habitat descriptions for Southwestern willow flycatcher study sites at the Lake Mead delta reported 95 percent of the vegetation as willow or cottonwood with only five percent as tamarisk (McKernan, 1997). An increase in sediment deposition in the deltas followed by lower lake levels allows establishment of native riparian habitat if the lowering of the lake is timed to match native seed dispersal. As such, conditions for establishment of native vegetation at the Lake Mead delta have improved since 1963 allowing cottonwood and willow to become the dominant vegetation.

Germination of willows at the Lake Mead delta likely occurred in the spring of 1990 at the approximate water surface elevation of 1185 feet msl (McKernan, 1997 and Reclamation, 1998c). The water surface elevations in 1996 and 1997 were 1192 feet and 1204 feet, respectively (Reclamation, 1998c). These higher lake levels inundated willow habitat in the Lake Mead delta and the Lower Grand Canyon (McKernan, 1997). Until 1998, the Lake Mead delta contained an extensive growth of riparian vegetation principally composed of Goodding willow (*Salix gooddingii*) (McKernan, 1997). By 1999 the Lake Mead delta willow habitat was completely inundated. To a lesser degree, these same effects may also be seen at the Virgin River delta. A higher delta gradient at the Virgin River delta results in a shorter period of inundation at high (greater than 1192 feet msl) lake levels (Reclamation, 1998c).

Section VI of the BA (Reclamation, 2000) provides additional information on fluctuations in lake levels and development of riparian habitat at Lake Mead. It notes that determining exactly how many acres of riparian habitat that may be formed due to declining levels at Lake Mead under the proposed interim surplus criteria is problematic. It further states that the majority of the Lake Mead shoreline does not have the soil necessary to regenerate riparian habitat, and that riparian habitat created by declining lake levels would most likely occur in four areas: Lake Mead delta, Virgin River delta, Muddy River delta and the portion of the Lower Grand Canyon influenced by Lake Mead. However, future wet hydrologic cycles, would inundate the newly established riparian habitat.

Although higher lake levels may be detrimental to riparian vegetation at the Lake Mead and Virgin River deltas, it may be beneficial to the development of riparian habitat in the lower Grand Canyon downstream of Separation Canyon, and the Virgin and Muddy rivers above Lake Mead (Reclamation, 1998c). Riparian habitat extends from the lake deltas upstream into the lower Grand Canyon and Virgin River Canyon. Development of riparian habitat in these canyons is directly dependent upon fluctuating lake levels and periods of inundation in the canyons. Data collected on riparian vegetation from 1998 Southwestern willow flycatcher surveys (McKernan, 1999) indicate a well-developed riparian corridor composed primarily of willow *(Salix* spp.) and tamarisk that forms extensive and continuous stands in some portions of the lower Grand Canyon. Lower water levels in Lake Mead that expose sediments in the Lake Mead, Virgin River and Muddy River deltas have the potential to benefit establishment of riparian habitat in

these areas. However, lower water levels in Lake Mead do not benefit establishment of riparian and marsh habitat in the lower Grand Canyon. In order for riparian and marsh habitats to become established along the Colorado River in the lower Grand Canyon, higher water levels in Lake Mead are necessary.

A few literature sources briefly examine influences of fluctuating lake levels on marsh habitat at the Lake Mead and Virgin River deltas. In 1995, the Lake Mead delta supported hundreds of acres of cattail and bulrush marsh (Reclamation, 1996a). This vegetation type increased after a period of high flows from 1983 to 1986. Deposits containing clay/silt sediments are necessary for the development of emergent marsh vegetation (Stevens and Ayers 1993). Low water velocity sites, such as the Lake Mead and Virgin River deltas, permit clay/silt particles to settle from suspension. These deposits provide a higher quality substrate for seed germination and seedling establishment than underlying sand because of their greater nutrient levels and moisture-holding capacity. With the appropriate water regime (i.e., higher river flows during winter with lower flows during summer), these sites are more likely to support emergent marsh vegetation (Reclamation, 1995b). Marsh vegetation that develops during low lake periods would be lost during periods of high lake levels; however, this habitat is more likely than cottonwood/willow to reestablish as lake levels fluctuate (Reclamation, 1996a). Marsh vegetation that develops during low lake levels is important habitat for many species, particularly breeding birds.

The interim surplus criteria BA (Reclamation, 2000) provides additional information on fluctuations in lake levels and development of riparian habitat at downstream reservoirs (Lake Mohave and Lake Havasu). The interim surplus criteria are not expected to affect levels of the downstream reservoirs as they would be continue to be regulated to meet downstream flood control, power generation and water delivery purposes.

3.8.3.1.2 Riverside Habitat

The riparian vegetation along the Colorado River is among the most important wildlife habitat in the region. Though not common, springs can be found within the GCNRA in intermittent drainages where they often support wetland plant communities. Between Glen Canyon Dam and Lees Ferry, springs are created by several spontaneous, copious flows from the lower canyon walls (NPS, 1987). The *Water Resources Management Plan and Environmental Assessment* for the GCNRA speculates that this spring flow originates from Lake Powell bank storage in the Navajo Sandstone (NPS, 1987), and thus, this area could be affected by changes in Lake Powell surface levels. Overall, lower lake levels are not likely to have any impacts on gardens around Lake Powell, but may have some impacts on springs directly associated with Glen Canyon Dam and extending downriver approximately two to three miles. In the lower canyon, arrowweed *(Pluchea sericea*) and horsetail are common. Below Havasu Creek, bermuda grass becomes the dominant ground cover at many sites (Reclamation, 1996a).

Mesquite (*Prosopis glandulosa*) historically occurred on the broad alluvial floodplains of the Colorado River on secondary and higher terraces above the main channel (LCRMSCP, undated). It still is a dominant species above the scour zone through the Grand Canyon (Ohmart et al., 1988; Turner and Karpiscak, 1980); however, tamarisk is replacing mesquite in many areas along the Colorado River.

Catclaw acacia occurs along watercourses and other areas where a summer water supply may be present (Barbour and Major, 1995; Brown, 1994; Holland, 1986; Sawyer and Keeler-Wolf, 1995). This species occurs in both upland and riparian vegetation associations (Reclamation, 1996a). Catclaw acacia in the Grand Canyon can occur with Apache plume (*Fallugia paradoxa*), a typical constituent in the acacia-mesquite habitat. It may also be found with desert broom (*Baccharis* spp), which is an obligate riparian species that occurs in the cottonwood-willow habitat type (Turner and Karpiscak, 1980).

Two types of marsh plant associations have been identified along the Colorado River (Stevens and Ayers, 1991). Marshes were historically found along oxbow lakes and in backwater areas along the Colorado River. Cattails, bulrushes, common reed and some less common emergent plants occur in marsh areas that develop on sediment deposits containing about half clay/silt and half sand (Reclamation, 1995).

In the lower Grand Canyon above Lake Mead, the interim surplus criteria may affect backwater marshes due to the changes in water levels. These changes in water levels could affect temperature and other water quality considerations, as well as the establishment of marsh vegetation. Section V of the BA (Reclamation, 2000) discusses historic and existing marsh, backwater and aquatic habitat on the lower Colorado River below Hoover, Davis and Parker dams.

3.8.3.2 SPECIAL-STATUS PLANT SPECIES

The list of special-status plants in Table 3.8-1 below is based on documented or potential occurrence within vegetation communities of the Glen Canyon National Recreation Area (GCNRA), Lake Mead National Recreation Area (LMNRA) and the Colorado River corridor in the lower Grand Canyon. No special-status plant species were identified for analysis below Hoover Dam. Nineteen plant species were removed from detailed consideration, as discussed in the next section. Four species could be affected by interim surplus criteria alternatives and are considered further.

Table 3.8-1
Special-Status Plant Species Potentially Occurring Within the Area of Analysis

Common Name	Scientific Name	Status
Alcove bog orchid	*Habenaria zothecina*	Federal Species of Concern
Alcove daisy	*Erigeron zothecinus*	Federal Species of Concern
Alcove deathcamas	*Zigadenus vaginatus*	Federal Species of Concern
Barrel cactus	*Ferrocactus acanthodes var. lecontei*	Northern Nevada Native Plant Society (NNNPS) Watch List species and Listed as Sensitive by the Service (Intermountain Region)
Brady's footcactus	*Pediocactus bradyi*	Federally Listed Endangered
Canyonlands sedge	*Carex scirpoidea var. curatorum*	Federal Species of Concern
Geyer's milkvetch[1]	*Astragalus geyeri var. triquetrus*	Federal Species of Concern; Nevada Critically Endangered
Grand Canyon evening-primrose[1]	*Camissonia specuicola ssp. Hesperia*	Federal Species of Concern
Hole–in-the-Rock prairie clover	*Dalea flavescens*	Federal Species of Concern
Jones cycladenia	*Cycladenia humilis var. jonesii*	Federally Listed Threatened
Kachina daisy	*Erigeron kachinensis*	Federal Species of Concern
Las Vegas bear poppy[1]	*Arctomecon californica*	Nevada Listed Critical Endangered
Navajo sedge	*Carex specuicola*	Federally Listed Threatened
New Mexico raspberry	*Rubus neomexicana*	Federal Species of Concern
Rock Daisy	*Perityle specuicola*	Federal Species of Concern
Rosy bicolored beardtongue	*Penstemon bicolor ssp. Roseus*	Federal Species of Concern
Satintail grass	*Imperata brevifolia*	Federal Species of Concern
Sawgrass	*Cladium californicum*	Federal Species of Concern
Sticky buckwheat[1]	*Eriogonum viscidulum*	Federal Species of Concern
Thompson's indigo-bush	*Psorothamnus thompsoniae var. whittingii*	Federal Species of Concern
Ute ladies' tresses	*Spiranthes diluvialis*	Federally Listed Threatened
Virgin River thistle	*Cirsium virgenense*	Federally Listed Species of Concern; Arizona Salvage-restricted, Protected Native Plant
Western hophornbeam	*Ostrya knowltonii*	Federal Species of Concern

[1] Species with the potential to be affected by the interim surplus criteria that are considered further.

3.8.3.2.1 Plant Species Removed from Further Consideration

This section discusses the reasons for eliminating certain special-status plant species from detailed consideration.

Special-status plant species that occur in hanging gardens at GCNRA include alcove bog orchid, alcove daisy, alcove deathcamas, canyonlands sedge, Kachina daisy, Navajo sedge, New Mexico raspberry, sawgrass, western hophornbeam and Virgin River thistle. The water source for these species comes from seepage from the Navajo sandstone that would not be affected by hydrologic changes associated with interim surplus criteria.

Barrel cactus, Brady's footcactus, rosy bicolored beardtongue, Jones cycladenia and Thompson's indigo-bush are desert species. This habitat type and associated plant species would not be affected by interim surplus criteria.

Hole-in-the-Rock prairie clover occurs in the Hall's Creek and Escalante drainages in the GCNRA, which would not be affected by hydrologic changes associated with the interim surplus criteria.

Rock daisy occurs at Cedar Mesa in GCNRA, growing in sandstone along the margins of an ephemeral stream channel at the canyon bottom that would not be affected by interim surplus criteria.

Satintail grass occurs within lower Wilson's Creek in the GCNRA, an area that would not be affected by interim surplus criteria.

Sawgrass has been found in the riparian zone of Alcove Canyon in Grand Canyon National Park, and in the riparian zone of Garden Canyon on the cliffs above Lake Powell. These riparian zones would not be affected by interim surplus criteria.

Ute ladies' tresses occur in moist to wet meadows along perennial streams at elevations between 4,300 and 7,000 feet msl. These occurrences are above those elevations that occur within the area under consideration. As such, this species would not be affected by interim surplus criteria.

Virgin River thistle occurs on sandy or gravelly alkaline slopes and washes and around saline seeps, alkaline springs or stream terraces. It occurs between elevations of 1968 and 6562 feet msl, and is associated with Mojave mixed scrub habitat. This habitat type would not be affected by interim surplus criteria. As such, this species would not be affected by interim surplus criteria.

3.8.3.2.2 Plant Species Considered Further

Geyer's Milkvetch - Geyer's milkvetch is known to occur along the shoreline of Lake Mead and is associated with stabilized sand dunes and sandy soils. Population trends

have not been well documented for Geyer's milkvetch. Germination may be tied to rainfall, and poor seed production and insect infestations may contribute to the limited distribution and/or small population sizes observed for this variety (Mozingo and Williams, 1980). Some populations have been directly affected by rising water levels at Lake Mead (i.e., Middle Point). Additional causes of decline for this taxon may include shoreline recreation, trampling and grazing by burros and livestock, off-road vehicle use, and utility corridors (Niles et al., 1995).

Threats to Geyer's milkvetch in the study area have not been well defined. This variety may be potentially threatened by: 1) loss of habitat from inundation and rising water levels at Lake Mead; 2) invasion of shoreline (beach) habitat by other plant species (i.e., tamarisk and arrowweed); and possibly 3) trampling and grazing by burros. Geyer's milkvetch occurs further back from the shoreline and may be less affected by these factors (E. Powell, 2000). Shoreline recreation does not currently appear to be a major threat to this species because the beaches where it occurs do not receive heavy recreational use. In addition, the species typically flowers and sets seed prior to the beginning of heavy use periods at Lake Mead (Niles et al., 1995; E. Powell, 2000). However, rising lake levels may potentially affect this species directly by inundation of plants or indirectly through inundation of suitable habitat.

Grand Canyon Evening Primrose - Grand Canyon evening primrose is a clustered herbaceous perennial plant with small flowers that are yellow or white at anthesis (flowering), but may turn to pink or lavender with aging. The Grand Canyon evening primrose occurs on beaches along or near the main stem Colorado River in the vicinity of Separation Canyon and downstream of Diamond Creek where available beach habitat is exposed (Brian, 2000 and Phillips, 2000). This species is likely adversely affected when beaches are disturbed through erosion or deposition of sediments during flood events. Some degree of flooding occurs seasonally as the result of increases in side-channel inflows during rainfall events. Additional flood flows result from periodic BHBF releases from Glen Canyon Dam. The degree to which flooding adversely affects this subspecies and which water levels are detrimental to the plants and its habitat is unknown. However, the amount of beach habitat in the Grand Canyon has decreased under post-dam conditions, and the remaining habitat is often invaded by riparian vegetation (Schmidt et al., 1998). Because this subspecies is found on good camping beaches, particularly in the lower portion of the Grand Canyon, it may also be adversely affected by disturbance associated with recreational beach use; however, this potential effect is not related to the interim surplus criteria.

Las Vegas Bear Poppy - Las Vegas bear poppy is a short-lived perennial species, occurring along the lower levels of the Lake Mead shoreline (E. Powell, 2000). This plant occurs on gypsum soils below the high water line of Lake Mead (1225 feet msl) on sloping flats. Little is known about the life cycle of the Las Vegas bear poppy, and populations vary in a "boom or bust" pattern (E. Powell, 2000). This species would benefit from lower water levels at Lake Mead, and could be adversely affected by

increases in water levels although timing of water fluctuations and associated effects to this species are unknown.

Sticky Buckwheat - Sticky buckwheat is found primarily along the Overton Arm of Lake Mead (Reveal and Ertter 1980, Niles et al., 1995). Smaller, potentially significant populations occur in the vicinity of Overton Beach, along the Virgin River Valley, and along the Muddy River. Major threats to sticky buckwheat at Lake Mead include: 1) loss of habitat from inundation and rising water levels at Lake Mead; 2) invasion of shoreline (beach) habitat by other plant species (i.e., tamarisk and arrowweed); and possibly three) trampling and grazing by burros. Shoreline recreation does not currently appear to be a major threat to this species because the beaches where it occurs do not receive heavy recreational use. In addition, the species typically flowers and sets seed prior to the beginning of heavy use periods at Lake Mead (Niles et al., 1995). This species would benefit from lower water levels at Lake Mead, and could be adversely affected by increases in water levels.

3.8.3.3 SPECIAL-STATUS WILDLIFE SPECIES

Special-status wildlife species with the potential to occur within the area under consideration in the United States are listed in Table 3.8-2. Two invertebrate, two amphibian, and one reptile species are of concern. Eleven bird species and two mammals are of concern. A number "1" after the species on the table indicates the species has the potential to be affected by the interim surplus criteria alternatives, and is therefore assessed in more detail.

Table 3.8-2
Special-Status Wildlife Species Potentially Occurring Within the Area of Analysis

Common Name	Scientific Name	Status
Invertebrates		
MacNeill's sootywing skipper	*Hesperopsis gracielae*	Federal Species of Concern
Kanab ambersnail	*Oxyloma haydeni kanabensis*	Federally Listed Endangered; Arizona Wildlife of Special Concern
Amphibians		
Northern leopard frog	*Rana pipiens*	Arizona Candidate for Listing
Relict leopard frog	*Rana onca*	Nevada State Protected; Arizona Wildlife of Special Concern
Reptiles		
Sonoran mud turtle	*Kinosternon sonoriense sonoriense*	California Species of Special Concern
Birds		
American peregrine falcon	*Falco peregrinus anatum*	California Endangered; Nevada State Protected and Endangered
Arizona Bell's vireo[1]	*Vireo bellii arizonae*	California Endangered
Bald eagle[1]	*Haliaeetus leucocephalus*	Federally Listed Threatened; California Endangered; Nevada State Protected and Endangered
California black rail[1]	*Laterallus jamaicensis coturniculus*	Federal Species of Concern; California Threatened
Clark's grebe[1]	*Aechmophorus clarkii*	Arizona Wildlife of Special Concern
Cooper's hawk[1]	*Accipiter cooperii*	California Species of Special Concern
Elf owl[1]	*Micrathene whitneyi*	California Endangered
Gilded flicker[1]	*Colaptes chrysoides*	California Endangered
Southwestern willow flycatcher[1]	*Empidonax traillii extimus*	Federally Listed Endangered (critical habitat designated); California Endangered; Nevada State Protected
Yuma clapper rail[1]	*Rallus longirositris yumaniensis*	Federally Listed Endangered; California Threatened
Western yellow-billed cuckoo[1]	*Coccyzus americanus*	Federally Proposed Endangered; California Endangered; Nevada State Protected
Mammals		
Colorado River cotton rat	*Sigmodon arizonae plenus*	Federal Species of Concern; California Species of Special Concern
Occult little brown bat	*Myotis lucifugus occultus*	Federal Species of Concern; California Species of Special Concern

[1] Species with the potential to be affected by the interim surplus criteria that are considered further in this analysis.

3.8.3.3.1 Wildlife Species Removed from Further Consideration

The Kanab ambersnail occurs in semi-aquatic habitat associated with springs and seeps. In the Grand Canyon, Kanab amber snail were originally known to occur only at Vasey's Paradise, a large perennial spring. As part of an effort to recover the species, Kanab amber snails were translocated from Vasey's Paradise to three other locations. One of the criteria used to select these sites was that it be above the level of any potential future flood flows past Glen Canyon dam. These populations would not be affected by the adoption of interim surplus criteria. Reclamation has consulted with the Service on the effects to the Vasey's Paradise population from the operations of Glen Canyon Dam. The resulting biological opinion (USFWS, 1996) continues to be implemented and will not be affected by the proposed action. There will be no effect from the adoption of interim surplus criteria.

The northern leopard frog is known to occur in association with a spring at one site below Glen Canyon Dam. The population was monitored before and after the 1996 BHBF and found to persist under these flows. This species receives consideration under the Glen Canyon Dam AMP (see Section 3.2.2). The minor changes to operations of Glen Canyon due to adoption of the interim surplus criteria are not expected to affect the northern leopard frog.

Historically, the relict leopard frog (*Rana onca)* was known from several locations along the Virgin river, and from the Overton arm of Lake Mead to north of St. George, Utah. This species was also known from the Muddy River and Meadow Valley Wash in Nevada, northwest of the Overton Arm. This species was thought to be extinct, but was rediscovered at three of 51 potential habitat sites surveyed in 1991. Surveys conducted for relict leopard frog included potential habitat within the historical range of the species (Bradford and Jennings 1997). There are confirmed sightings of this species at springs about two miles (3.2 km) west of Stewarts Point on the Overton Arm of Lake Mead. A fourth population of leopard frog on the Virgin River near Littlefield, Arizona is within the range of the lowland leopard frog (*R. yavapaiensis)* and is still awaiting additional studies to confirm its taxonomic status. Other unconfirmed sightings are on the Virgin River near Littlefield, Arizona and about four km (2.5 miles) downstream from Hoover Dam.

In general, leopard frogs inhabit springs, marshes, and shallow ponds, where a year-round water supply is available. Emergent or submergent vegetation such as bulrushes or cattails provides the necessary cover and substrate for cover and oviposition (Jennings et al., 1994). Suitable aquatic habitat, as well as, adjacent moist upland or wetland soils is required by the relict leopard frog. In addition, dense herbaceous cover and a canopy of cottonwoods or willows characterize habitat for this species.

The relict leopard frog populations located near the Overton Arm of Lake Mead are associated exclusively with geothermally influenced and perennial desert spring communities. Because the known populations are currently confined within a five-mile

(8km) area (Bradford and Jennings 1997), they are susceptible to extirpation from localized impacts. Threats to this species include habitat destruction, lowering of the water table, and predation by introduced bullfrogs (AGFD, 1996; AGFD 1998).

The known occurrences of relict leopard frogs are in association with springs that will not be affected by the interim surplus criteria alternatives being considered. If additional emergent marsh vegetation develops at the Lake Mead and Virgin River deltas as the result of lower lake levels, it may provide potential habitat for the relict leopard frog. However, predation by introduced fishes and bullfrogs may preclude occurrence of the leopard frogs in these areas. Reclamation concludes that the interim surplus criteria do not have the potential to affect the relict leopard frog.

MacNeill's sootywing skipper is a butterfly found along the Colorado River from southern Utah and Nevada to Arizona and southeastern California (Reclamation, 1996a). Confirmed records of this species are reported for the Arizona counties of Mohave, La Paz, Yuma, Yavapai, Maricopa and Pinal. The MacNeill's sootywing skipper is also present in San Bernardino, Riverside and Imperial counties in California. This species also occurs along the Muddy River above Lake Mead (Austin & Austin, 1980).

The larval host plant for MacNeill's sootywing skipper is quailbrush (*Atriplex lentiformis*). Quailbrush is the largest salt bush found in Arizona and forms dense thickets along the drainage system of the Colorado River (Emmel and Emmel, 1973). Quailbrush is associated with floodplains located in alkaline soil areas with adequate water resources (Kearney and Peebles, 1951). Specific surveys for this species and larval host plants have not been conducted in the lower Grand Canyon; however, the documented occurrence of MacNeill's sootywing skipper along the Muddy River above Lake Mead indicates there is a likelihood of occurrence in the lower Grand Canyon. Suitable habitat for this species likely requires stands of more than one host plant (W. Wiesenborn, 1999). Although this species occurs in the area of analysis, the host plant occurs on alluvial floodplains and has little potential to be affected by the alternatives considered for the interim surplus criteria.

Lake Powell and Lake Mead provide breeding and wintering habitat for American peregrine falcons. The peregrine falcon breeds at sites on Lake Mead, and the upper portion of Lake Mohave. Wintering and breeding peregrines are also found around Lake Powell, with an estimated 50 breeding areas (Interior, 1995), and 19 wintering territories (Hetzler, 1992a). Based on historical data, the average height above water of peregrine nests at GCNRA is approximately 460 feet (141 meters), with average cliff heights of 630 feet (193 meters) (Hetzler 1992a, Hetzler 1992b). These data include nest sites in Glen Canyon immediately below the Glen Canyon Dam as well as sites on Lake Powell. Glen Canyon Dam operations have resulted in increased riparian vegetation which supports a larger population of passerines and increased the food base for peregrine falcons.

Existing and potential American peregrine falcon breeding habitat also occurs in the Grand Canyon between Glen Canyon Dam and Lake Mead and in Black Canyon, (south of Lake Mead). Because their nesting sites are well above the water and their food base has increased, peregrine falcons would not be affected by hydrologic changes associated with the interim surplus criteria and have been eliminated from further analysis.

The Sonoran mud turtle, Colorado River cotton rat, and occult little brown bat were removed from further consideration because there are no known occurrences in the analysis area.

3.8.3.3.2 Special-Status Wildlife Species Considered Further

Arizona Bell's Vireo - The Arizona Bell's vireo (*Vireo bellii arizonae*) is distributed throughout the river systems of the Southwest desert and have been documented in the Virgin and Muddy rivers, and the lower Colorado River. Since 1900, populations of this subspecies of Bell's vireo have declined along the lower reaches of the Colorado River, where it is now a rare, to locally uncommon, summer resident from Needles south to Blythe (Brown et al., 1983; Zeiner et al., 1990a; Rosenberg et al., 1991). Since the completion of Glen Canyon Dam in 1963, the Bell's vireo has expanded its range eastward into Grand Canyon National Park (Brown et al., 1983). An extensive riparian scrub, that has developed along the Colorado River in the Grand Canyon largely composed of tamarisk and willow, supports a significant population of Bell's vireo (Brown et al., 1983). The Grand Canyon population of Bell's vireo is regionally important due to the substantial decline of this subspecies at lower elevations. The riparian habitat utilized by Arizona Bell's vireo may potentially be affected by the interim surplus criteria.

Bald Eagle - The bald eagle historically ranged throughout North America except extreme northern Alaska and Canada and central and southern Mexico. In 1978, in response to lowering population and reproductive success, the Service listed the bald eagle throughout the lower 48 states as endangered except in Michigan, Minnesota, Wisconsin, Washington and Oregon, where it was designated as threatened (43 FR 6233, February 14, 1978). In 1982, a recovery plan was developed specifically for the southwestern bald eagle; the geographic boundary includes southeast California within 10 miles of the Colorado River or its reservoirs. The bald eagle population has clearly increased in number and expanded its range since it was listed. This improvement is a direct result of the banning of DDT and other persistent organochlorines, habitat protection, and from other recovery efforts (60 FR 36001, July 12, 1995). On August 11, 1995, FWS reclassified the bald eagle from endangered to threatened in the lower 48 states. (60 FR 133, pg. 3600, August 12, 1995).

Reclamation's 1996 BA concluded that its Lower Colorado river operations and maintenance activities are not likely to adversely affect the food resources, foraging opportunities, or the nesting habitat of the bald eagle. Based on data from bald eagle winter counts conducted by the AGFD since 1992, eagles are not considered rare within

the project area. Wintering birds are expected to continue using the river and most likely will congregate where food resources are plentiful and excessive disturbance from recreation can be avoided. The 1996 BA also cites studies by Hunt et al., (1992) that conclude reservoirs and dams did not appear to have a negative effect on bald eagle reproduction. River operations and maintenance may affect establishment of newly regenerated cottonwood/willow stands that could provide future nesting and perching substrate for eagles. However, as documented in Hunt et al. (1992), bald eagles can successfully nest on other substrates (cliffs, pinnacles). Reclamation's ongoing native riparian plant restoration program has the potential to increase available tree nesting and perching habitat along the river. No evidence exists to suggest that the food resources available in the reservoirs and river are limiting nesting. Because of the minor changes to the operation of Glen Canyon Dam and the minor hydrologic changes in the reservoirs and along the river, Reclamation determined that adoption of the interim surplus criteria would not adversely affect the bald eagle.

California Black Rail - California black rail (*Laterallus jamaicensis coturniculus*) have recently been documented in the Virgin River Canyon, including the corridor above Lake Mead (McKernan, 1999). In general, Flores and Eddleman (1995) found that black rails utilize marsh habitats with high stem densities and overhead coverage that were drier and closer to upland vegetation than randomly selected sites. Marsh edges with water less than 2.5 centimeters (1 inch) deep dominated by California bulrush and three-square bulrush (*Scirpus californicus* and *S. americanus*, respectively) are utilized most frequently. Areas dominated by cattail are also used regularly, but only in a small proportion to their availability and generally within 50 meters (164 feet) of upland vegetation where water depth is 3.0 centimeters (1.2 inch). The occurrence and potential impacts to species along the river corridor in Mexico are also discussed in Section 3.16.

Clark's Grebe – Clark's grebes (*Aechmophorus clarkii*) are typically less abundant than the western grebe at most locations throughout their range (Ratti, 1981; Zeiner et al., 1990a). A 1977 winter survey found Clark's grebes comprised less than 12 percent of *Aechmophorus* grebe sightings at locations within California and areas near Lake Mead (Ratti, 1981). At Lake Mead, a total of 321 western grebes were detected during the winter, while only three Clark's grebes were observed. At Lake Havasu, western grebes are also more abundant than Clark's grebes in the winter. However, Clark's grebes are more numerous in the breeding season, making up approximately 65 percent of the breeding colony (Rosenberg et al., 1991). Although the cattail and bulrush marsh habitat found at the Lake Mead delta exhibits characteristics preferred by Clark's grebe, it is not known whether this species currently occurs at the delta. The marsh habitat at the Lake Mead and Virgin River deltas, and in the Colorado and Virgin rivers above Lake Mead may potentially be utilized by Clark's grebe and may be affected by the interim surplus criteria.

Cooper's Hawk – Cooper's hawks (*Accipiter cooperii*) are associated with deciduous mixed forests and riparian woodlands and nests mainly in oak woodlands, but also use willow or eucalyptus woodlands. The Cooper's hawk nests near streams and prefers mature trees with a well-developed understory for nesting sites (Ziener et al., 1990a). Breeding activity has been documented in the lower Grand Canyon, below Separation Canyon, and in the lower Virgin River above Lake Mead (McKernan, 1999). The riparian habitat currently utilized by Cooper's hawk in the lower Grand Canyon and lower Virgin River may be affected by the interim surplus criteria.

Elf Owl – The elf owl (*Micrathene whitneyi*) is a secondary cavity nester and, as a result, the population status of the elf owl is directly dependent on available nesting holes in trees made by woodpeckers. As an insectivore, the elf owl is also dependent on sufficient numbers of insects during the breeding season (Johnsgard, 1988). In California, at the extreme northwest edge of its range, the elf owl is likely declining in the few desert riparian habitats that it occupies (Johnsgard, 1988). There may also be a general decline in Arizona, although it may be increasing its range in north-central Arizona and western New Mexico. The species' overall status in the Southwest has not been determined. The elf owl was never a common or widespread species along the lower Colorado River. Surveys of riparian habitats in the lower Colorado River Valley in 1987 reported between 17 and 24 owls at ten different sites (CDFG, 1991). Population estimates in California for the early 1990s were 17 to 25 breeding pairs (CDFG, 1991; Rosenberg et al., 1991). Riparian habitat in the Grand Canyon may provide suitable breeding habitat for the elf owl; however, based on the available information, it is unknown whether elf owls occur. The riparian habitat along the Colorado River above Lake Mead may be utilized by elf owl and has the potential to be affected by the interim surplus criteria.

Gilded Flicker – The gilded flicker (*Colaptes chrysoides*) occurs along the lower Colorado River Valley in southern Arizona and southeastern California (Rosenberg et al., 1991). In California, the gilded flicker is an uncommon resident along the Colorado River north of Blythe (Garrett and Dunn, 1981, CDFG, 1991). During the breeding season, the gilded flicker is found in saguaro habitats, mature cottonwood-willow riparian forests, and occasionally mesquite habitats with tall snags (CDFG, 1991; Rosenberg et al., 1991). This species was historically widespread in riparian habitat all along the Colorado River Valley. Based on available information, it is not known whether this species occurs in the lower Grand Canyon, although suitable habitat is present in both the riparian and mesquite habitats.

Southwestern Willow Flycatcher – The Southwestern willow flycatcher (*Empidonax traillii extimus*) is a riparian obligate, neotropical migratory insectivore that breeds along rivers, streams, and other wetlands where dense willow, cottonwood, tamarisk, or other similarly structured riparian vegetation occurs (Service, 1995a; McKernan 1999; AGFD, 1997e). Populations of breeding Southwestern willow flycatchers have been recorded at the upper Lake Mead delta, the Virgin River delta, Mormon Mesa North, and the Lower Grand Canyon (AGFD, 1997e; Sogge et al., 1997). However, due to

high lake levels, as discussed previously, the Lake Mead and Virgin River delta willow flycatcher habitat has been inundated. This change in reservoir elevation has permitted suitable willow riparian habitat to develop in the Colorado River corridor from Lake Mead up to approximately Separation Canyon (McKernan, 1999). The occurrence of this species and habitat below Lake Mead to the SIB is discussed in the BA for this proposed action (Reclamation, 2000).

The Grand Canyon population of Southwestern willow flycatcher is important from a scientific and management perspective because it is one of the longest continuously monitored populations in the southwest (Sogge et al., 1997). In support of this view, the USFWS designated river mile 39 downstream to river mile 71.5 as critical habitat for this species (USFWS, 1997a, 1997c). This habitat occurs in the upper Grand Canyon and will not be affected by the interim surplus criteria.

High lake levels (above 1192 feet) appear to be detrimental to Southwestern willow flycatcher nesting habitat at Lake Mead delta due to potential loss of suitable nest trees (Reclamation, March 1998). Lake levels below 1192 feet during the willow flycatcher breeding season (April through August) appear to allow for increased willow habitat establishment which would be beneficial to the species. From January 1978 until June 1990, Lake Mead elevations were above 1182 feet on a continuous basis. In June 1990, Lake Mead elevation declined to approximately 1182 feet and stayed below that elevation until the end of 1992 (Reclamation, 2000). If saturated soils are present in areas occupied by willow flycatcher, declines in lake levels during June have little to no effect on nesting. In contrast, when Lake Mead's elevation is high enough to inundate the delta, which typically occurs during June and July (Reclamation, 2000), willow flycatchers would not be affected because their territories and possibly nest sites would be established. Because suitable habitat utilized by Southwestern willow flycatcher may be affected by changes in Lake Mead water levels that would result from implementation of the interim surplus criteria, the species is considered in the environmental consequences section below. The interim surplus criteria are not expected to result in hydrologic changes below Hoover, Davis and Parker dams that would adversely affect the flycatcher.

Yuma Clapper Rail – The Yuma clapper rail (*Rallus longirostris yumanensis*), one of seven North American subspecies of clapper rails, occurs primarily in the lower Colorado River Valley in California, Arizona and Mexico. It is a fairly common summer resident from Topock Gorge south to Yuma in the United States, and at the Colorado River delta in Mexico. In the area under consideration, the Yuma clapper rail is associated with freshwater marshes with the highest densities of the subspecies occurring in mature stands of cattails and bulrush (Reclamation, August 1999). In recent years, individual clapper rails have been heard at Laughlin Bay and Las Vegas Wash in southern Nevada (NDOW, 1998), and individuals have been documented at the Virgin and Muddy rivers including the Virgin River floodplain between Littlefield, AZ and the Virgin River Delta, NV (McKernan, 1999), and at sites within the lower Grand Canyon (McKernan, 1999). The occurrence of the Yuma Clapper below Lake Mead to

the SIB is discussed the BA for this proposed action (Reclamation, 2000). The marsh habitat utilized by Yuma clapper rail has the potential to be affected by the interim surplus criteria.

Western Yellow-billed Cuckoo – Historically, the western form of the yellow-billed cuckoo (*Coccyzus americanus*) was a fairly common breeding species throughout the river bottoms of the western United States and southern British Columbia (Gaines and Laymon, 1984). Due to the loss of riparian woodland habitat, the cuckoo has become an uncommon to rare summer resident in scattered locations throughout its former range. Western yellow-billed cuckoo have been documented in riparian habitat in the lower Grand Canyon and Virgin River above Lake Mead (McKernan, 1999) (Reclamation, 2000) as well as in habitat along the river corridor below Lake Mead and has the potential to be affected by the interim surplus criteria.

3.8.3.4 SPECIAL-STATUS FISH SPECIES

Described below are special-status fish species present within the area under consideration. Table 3.8-3 lists special-status fish species including common name, scientific name and status. Currently, the Service is supplementing existing recovery plans for the four endangered fish species included in this analysis.

Critical habitat has been designated for each of the federally listed fish species (Federal Register: March 21, 1994), and portions of this habitat exist within the area of potential effect (Reclamation, 2000).

Table 3.8-3
Special-Status Fish Species Potentially Occurring Within the Area of Analysis

Common Name	Scientific Name	Status
Bonytail	*Gila elegans*	Federally Listed Endangered (critical habitat designated); California Endangered; Nevada State Protected
Colorado pikeminnow	*Ptychocheilus lucius*	Federally Listed Endangered (critical habitat designated); California Endangered
Flannelmouth sucker	*Catostomus latipinnis*	Federal Species of Concern; Arizona Wildlife Species of Concern; Bureau of Land Management Nevada Special Status Species
Humpback chub	*Gila cypha*	Federally Listed Endangered (critical habitat designated)
Razorback sucker	*Xyrauchen texanus*	Federally Listed Endangered (critical habitat designated)

Bonytail – Adult bonytail (*Gila elegans*) were once found throughout the big rivers and major tributaries of the Colorado River basin. Younger fish utilize the smaller streams and quiet areas. Bonytail prefer substrate which consists of clay, soft mud, or mud and sand, or occasionally rocks, gravel or rubble with little or no vegetation (Sigler

and Miller, 1963; Wydoski, 1995). Adults range between eight and 17 inches in length and weigh just over one pound. The species can live for over 40 years. Spawning occurs in late spring to early summer usually over gravel bars with no nest being constructed. Gravid females can carryover 10,000 eggs each. Bonytail are carnivorous, feeding on insects, crustaceans, small fish, and snails; however, filamentous algae are often consumed (NPS, 1998).

The bonytail is now the rarest native fish within the Colorado River Basin (NPS, 1998). The decline in the number of bonytail are thought to be a result of changes in historical stream flow and water temperatures, blockage of migratory routes by dams and introduction of non-native fish species. At Lake Powell, present numbers are accounted for by fish older than 40 years of age; no recruitment has been demonstrated in recent years (NPS, 1998).

Bonytail are believed to be extirpated in the Colorado River from Glen Canyon Dam to Hoover Dam (McCall, 1979 and Reclamation, 1996a). Small populations may still exist in the Upper Basin, but there is much confusion in fish identification due to the similarity in physical appearance with roundtail chubs (Reclamation, 1996a). Five suspected bonytail were captured in Cataract Canyon between 1985 and 1988, with one caught in Lake Powell near Wahweap Marina (Maddux et al., 1993 and Reclamation, 1995).

Critical habitat for bonytail includes the Colorado River from Hoover Dam to Davis Dam, including Lake Mohave. It also includes the Colorado River from the northern boundary of Havasu National Wildlife Refuge to Parker Dam, including Lake Havasu. The largest remaining population of bonytail in the entire Colorado River Basin resides in Lake Mohave. There were at least nine augmentation stockings of bonytail into Lake Mohave between 1981 and 1991 (Reclamation, 1996a). Efforts are being undertaken to repatriate bonytail back to Lake Havasu from lakeside coves using young obtained from Dexter National Fish Hatchery (Reclamation, 1996a). The primary limiting factor for bonytail appears to be non-native fish predation of the early life stages (egg to subadult) (Reclamation, 1996a).

Colorado pikeminnow – The Colorado pikeminnow (*Ptychocheilus lucius*) is the largest member of the minnow family within North America and is endemic to the Colorado River system. It was, historically, the top predator fish in the Colorado River, but native populations are now restricted to the upper Colorado River Basin (Reclamation, 1996a). A portion of their current distribution includes the Colorado River from Palisades, Colorado, downstream to Lake Powell (NPS, 1998). Colorado pikeminnow have been captured in Lake Powell as recently as 1999 (Reclamation, file data). Designated critical habitat within the area of effect for the analysis is limited to the normal pool elevation of Lake Powell. Colorado pikeminnow are now considered extirpated from the entire Lower Basin; where they were once extremely abundant. The last known wild adults from the lower Colorado River were captured in the 1960s, and the last known specimens from the Gila River basin were collected in 1958 (Minckley,

1973). Colorado pikeminnow were taken from Lake Havasu in the 1970s. Populations in the upper basin are thought to be stable or increasing, with documented natural recruitment.

The species is adapted to large seasonal flow variations, high concentrations of silt, turbulence, periodically low food availability and naturally variable riverine subsystems. It is typically a big river fish where the current is strong and the water heavily silt laden. Colorado pikeminnow are migratory and can utilize anywhere from 100 to 200 miles of river to complete their life cycle. Spawning takes place from spring to late summer depending on water temperatures. Larva and juvenile pikeminnow can drift 60 to 150 miles from spawning beds into nursery areas where they mature to a size that mostly prevents predation (Maddux et al., 1993; Sigler and Miller, 1963).

Flannelmouth sucker – The flannelmouth sucker (*Catostomus latipinnis*) was historically found in medium to large rivers throughout the upper and lower Colorado River drainage (Joseph et al., 1977; AGFD, 1996a). Although the flannelmouth sucker is currently widely distributed in the upper Colorado River Basin (Holden and Stalnaker 1975a, b; McAda, et al., 1994), its occurrence in the lower Colorado River Basin has become more restricted. The species' range in the Upper Basin includes the main stem of the Colorado River, numerous tributaries that drain a large portion of Colorado and Utah, and the San Juan River drainage in New Mexico and Utah. In the Lower Basin, the flannelmouth sucker occurs only in localized areas of suitable habitat (Sublette et al., 1990). Populations in the Lower Basin occur in the Little Colorado River, Virgin River, Colorado River in Glen Canyon, Grand Canyon, and immediately below Davis Dam, and several small tributaries to the Colorado River above Lake Mead (AGFD, 1996a; Valdez and Carothers, 1998).

Flannelmouth suckers typically require medium to large flowing streams and react poorly to impounded habitats or habitats influenced by impoundments (Minckley, 1973), and the artificial thermal regime created by impoundments. Subadult flannelmouth suckers in the Grand Canyon use sheltered shoreline habitats, backwaters, and tributary inflows (Valdez and Ryel, 1995). Conversely, adults can be found in a variety of mainstem habitats, including: tributary mouths, vegetated shorelines, mid-channel cobble bars (Valdez and Ryel, 1995), eddies (Holden and Stalnaker, 1975a; and Valdez and Ryel, 1995) and riffles (Holden and Stalnaker, 1975a). Spawning can take place from spring to early summer and is often preceded by an upstream migration.

Since 1986, the AGFD has conducted yearly monitoring of flannelmouth sucker populations in the Colorado River from Lees Ferry downstream to Lake Mead. The Glen Canyon Monitoring and Research Center (1998) has funded monitoring and research activities for this species. The objective of this program is to provide the knowledge base required to implement ecosystem management strategies within an adaptive management framework.

Humpback chub – Endemic to the Colorado River, the humpback chub (*Gila cypha*) inhabits the canyon-bound sections of the Colorado, Green and Yampa rivers, with high fidelity for particular localized sites. Young are not known to widely disperse. The historical abundance and distribution of the fish is not well known. Designated critical habitat includes the Colorado River from Nautiloid Canyon to Granite Park in the Grand Canyon, and the lower eight miles of the Little Colorado River, including its confluence with the Colorado River. The largest population still extant is found in and near the Little Colorado River within the Grand Canyon (Maddux et al., 1993; Valdez and Ryel, 1995). This population uses the Little Colorado River for spawning and rearing. The possibility exists that humpback chub found in the Middle Granite Gorge and lower Grand Canyon may represent a separate population (Reclamation, 1996a).

Humpback chub becomes reproductively active between May and July depending on location and the hydrograph. Males become reproductively mature within three years. Spawning occurs during the highest spring flows when water temperatures approach 68°F (20°C) over cobble or gravel surfaces. Larvae tend to utilize silty bottom habitats. Later, humpback chub utilize a variety of habitats within a boulder strewn canyon environment (i.e., pools, riffles and eddies). They move between habitats dependent on life history needs and natural habitat change (NPS, 1998).

Young humpback chub feed mainly from the bottom eating small invertebrates and diatoms. Adults also feed mainly from the bottom but also feed on floating aquatic and terrestrial insects (SWCA, 1997; Valdez and Ryel, 1995; Wydoski, 1995).

Razorback sucker – The razorback sucker (*Xyrauchen texanus*) was formerly the most widespread and abundant of the big-river fishes in the Colorado River. In the lower basin, razorback sucker apparently began to decline shortly after impoundment of Lake Mead in 1935. Today the species occupies only a small portion of its historical range, and most occupied areas have very low numbers of fish. Critical habitat for the razorback sucker includes Lake Mead and Lake Mohave, and the river reach between them. It also includes the Colorado River and its 100-year floodplain from Parker Dam to Imperial Dam. Reclamation's BA includes a detailed discussion of this species occurrence and requirements (Reclamation, 2000).

In Lake Mead, the fish were abundant for many years after the reservoir filled, but declined during the 1960s and 1970s. The current population in Lake Mead is estimated to be less than 300 fish. The capture of a small number of juvenile adults since 1997 along with recent capture of larval razorback sucker in the spring of 2000 (Holden, Personal communication) indicates some successful recruitment is taking place. There are two populations of razorback sucker in Lake Mead in Las Vegas Bay and Echo Bay. A five-year study is underway to determine population size and movements of this fish and to determine why there is a small number of fish able to recruit, thus enabling a small number of razorback sucker to persist in Lake Mead.

The razorback sucker is a large fish, reaching over two feet in length and eight pounds in weight. Reproduction in the lower basin has been studied in Lake Mead and Lake Mohave. Spawning in Lake Mohave typically begins in January or February, while in Lake Mead it begins slightly later (Jonez and Sumner, 1954). Spawning typically runs 30 to 90 days at water temperatures ranging from 55°F to 70°F (13°C to 21°C). Spawning areas tend to be wave-washed, gravelly shorelines and shoals. Fish spawn in water from three to 20 feet in depth with the majority of fish in the five- to 10-foot range. Razorback suckers apparently spawn continuously throughout the spawning season, with females releasing only a portion of their gametes at each event. Spawning occurs both day and night on Lake Mohave (Reclamation, file data). Eggs hatch in five to 10 days depending on water temperature. Optimal hatching success is around 68°F (20°C); hatching does not occur at extremes of cold or hot (50°F or 86°F; 10 C to 30 C) (Marsh and Minckley, 1985). Larvae swim up within several days and begin feeding on plankton. Juvenile razorback suckers in lakeside rearing ponds hide during the day in dense aquatic vegetation and under brush and debris and in rock cavities (Reclamation, 1996a, 2000).

Most of the remnant populations of razorback sucker are found in Lake Mead and Lake Mohave (Reclamation, 2000). They are considered rare in the Grand Canyon and have been documented in Lake Powell as recently as 1999 (Reclamation, file data). Spawning success has been limited by the predation of eggs and young by non-native species. Currently, efforts are being made to introduce razorback sucker that have been raised in areas free of predators into Lake Mohave to help establish a larger population of breeding adults, and continued study of the persistent population in Lake Mead is planned (Reclamation, 2000).

3.8.4 ENVIRONMENTAL CONSEQUENCES

This section evaluates the potential effects on special-status species and their habitat that could occur as a result of implementation of the interim surplus criteria alternatives under consideration. This section is divided into three main special-status species categories: plants, wildlife and fish. For each category, the potential effects under baseline conditions are presented first, followed by a discussion of the alternatives as compared to baseline conditions.

3.8.4.1 EFFECTS ON SPECIAL-STATUS PLANT SPECIES

Only four plant species would potentially be affected by hydrological changes associated with the interim surplus criteria alternatives: Geyer's milkvetch, Grand Canyon evening primrose, Las Vegas bear poppy and sticky buckwheat.

3.8.4.1.1 Baseline Conditions

Geyer's milkvetch, which occurs along the shoreline of Lake Mead, is mainly threatened by loss of habitat from inundation as a result of rising water levels at Lake

Mead, invasion of shoreline (beach) habitat by tamarisk and arrowweed, and possibly trampling and grazing by burros. Shoreline recreation does not currently appear to be a major threat to this species because the beaches where it occurs do not receive heavy recreational use. This species would be affected by variations in Lake Mead surface elevations if suitable habitat were inundated. Baseline conditions indicate a decreased potential over time for such inundation to occur. If lake levels decline, exposing sand dune habitat and sandy soils, the species could benefit. However, if these areas are colonized by tamarisk after being exposed, there would be no net benefit.

Grand Canyon evening primrose are found in beach habitat within the Grand Canyon. The beach habitat in the Grand Canyon is often invaded by riparian vegetation and is also utilized by recreationists, which results in adverse conditions for Grand Canyon evening primrose establishment. To the extent that beach habitat is altered by releases from Glen Canyon Dam, this species is covered under the Glen Canyon Dam ROD (1996) and Adaptive Management Program. Indirect effects to the habitat for this species may, however, result from fluctuations in Lake Mead pool elevations. Under baseline conditions, Lake Mead elevations are projected to decline over time. Reductions in Lake Mead elevations would likely result in an increase in exposed beach habitat in the lower Grand Canyon to Lake Mead that would potentially provide more suitable habitat for Grand Canyon evening primrose.

Las Vegas bear poppy occurs along the lower levels of the Lake Mead shoreline. As with the Geyer's milkvetch, this species would benefit from lower water levels at Lake Mead and would be adversely affected by any increases in water levels. Benefits of lower surface elevations would be negated if invasion of exposed areas by tamarisk or other weedy exotic plant species were to occur.

Sticky buckwheat is found primarily along the Overton Arm of Lake Mead with smaller, potentially significant populations occurring in the vicinity of Overton Beach, along the Virgin River Valley, and along the Muddy River. As with the other three special-status plant species discussed, the major threats to sticky buckwheat at Lake Mead are the loss of habitat from inundation as the result of rising water levels at Lake Mead, and the invasion of shoreline (beach) habitat by tamarisk and arrowweed. This species could potentially benefit from lower lake levels at Lake Mead provided the newly exposed habitat was not colonized by weedy exotic plant species.

3.8.4.1.2 Effects of the Alternatives

Potential effects to special-status plant species under the each of the alternatives would be similar to baseline conditions. Each alternative would result in Lake Mead elevations that would vary from those under baseline conditions, with the Flood Control Alternative resulting in slightly higher reservoir elevations, and the Basin States, Six States, California and Shortage Protection alternatives having lower reservoir elevations as compared to baseline projections. (Section 3.3 discusses the modeling results concerning potential future reservoir elevation trends in detail.) The differences in

potential future Lake Mead elevations under the alternatives as compared with baseline conditions are not expected to adversely affect the special-status plant species discussed above, as lower Lake Mead elevation trends may benefit these species.

3.8.4.2 EFFECTS ON SPECIAL-STATUS WILDLIFE SPECIES

Special-status wildlife species with potential to occur in the area under consideration are Arizona Bell's vireo, bald eagle, California black rail, Clark's grebe, Cooper's hawk, elf owl, gilded flicker, Southwestern willow flycatcher, Yuma clapper rail and western yellow-billed cuckoo.

Under baseline conditions and each of the alternatives, the water surface elevation projected for Lake Powell indicates a potential for slightly declining water levels during the first 15 years of the period of analysis. Figure 3.3-6 in Section 3.3 shows modeled Lake Powell elevations. The differences between the alternatives and baseline conditions would not affect any special-status wildlife species identified for this analysis and as a result, Lake Powell is not discussed further.

3.8.4.2.1 Baseline Conditions

Water fluctuations of Lake Mead generally preclude development of shoreline riparian vegetation, with the exception of tributary inflow areas such as the Virgin River and Lake Mead deltas (Reclamation, 1999). Woody riparian vegetation (i.e., cottonwood and willow) become abundant from below Separation Canyon to the Lake Mead delta as lake levels declined following high runoff years of 1983-1986 (Reclamation, 1995). As the probability for declining reservoir levels increases over time under baseline projections (as shown on Figure 3.3-13 in Section 3.3), an increase in the amount of sediment exposed in the Lake Mead and Virgin River deltas would again create favorable conditions for establishment of woody riparian habitat. An increase in riparian habitat along the deltas would potentially benefit Arizona Bell's vireo, Cooper's hawk, elf owl, gilded flicker, western yellow-billed cuckoo and Southwestern willow flycatcher. The interim surplus criteria alternatives are not expected to impact these species in the river corridor below Hoover Dam to the SIB (Reclamation, 2000).

The increase in the probability for Lake Mead water levels to decline under baseline projections would also increase potential for sediment exposure that may create suitable conditions for marsh vegetation to develop and/or expand at the Lake Mead and Virgin River deltas, as well as along the Colorado, Virgin and Muddy rivers above Lake Mead. This would in turn increase the amount of preferred habitat for California black rail, Clark's grebe and Yuma clapper rail.

Riparian and marsh vegetation is typically located within the shallow water table zone near the lake shoreline. Although lowering lake levels has the potential to increase the amount of riparian and marsh vegetation because of increased sediment exposure, these habitat types would only become established if lake levels do not drop excessively. If

the exposed sediment is too far above the water table, riparian and marsh habitat is not likely to become established.

3.8.4.2.2 Effects of the Alternatives

Potential effects on special-status wildlife species would be similar to baseline conditions. Each alternative would result in Lake Mead elevations that would vary from those under baseline conditions, with the Flood Control Alternative resulting in slightly higher reservoir elevations, and the Basin States, Six States, California, and Shortage Protection alternatives having lower reservoir elevations as compared to baseline projections. (Section 3.3 discusses the modeling results concerning potential future reservoir elevation trends in detail.) Under each of the alternatives, vegetation associated with Lake Mead, including riparian and marsh habitat in the Virgin River and Lake Mead deltas, would experience changes similar to those described above under baseline conditions. Consequently, the potential for changes in special-status species' habitat associated with Lake Mead, and the Lake Mead and Virgin River deltas under the alternatives would be similar to those described for baseline conditions above.

3.8.4.3 EFFECTS ON SPECIAL-STATUS FISH SPECIES

Operations at Glen Canyon Dam and Hoover Dam include various programs designed to aid in the conservation and recovery of endangered native species in the lower Colorado River basin. These programs include Section 7 consultations under the ESA, the Glen Canyon Dam Operation AMP and ROD (1996), and the LCRMSCP. Reclamation is also a participant in the Upper Colorado and San Juan River Basin Recovery Implementation Programs for endangered fish in the upper Colorado River basin. Critical habitat for all four of the endangered fish species has been designated by the Service. Adverse modification of these habitats is prohibited under Section 7 of the ESA. These programs and protections will remain in effect under baseline conditions and each of the interim surplus criteria alternatives. As discussed, conditions are not favorable for endangered fish. Future baseline conditions and each of the interim surplus criteria are expected to increase, to varying degrees, the potential for reduced reservoir surface elevations. The following discuss effects of the alternatives on each of the special-status fish species.

3.8.4.3.1 Baseline Conditions

Bonytail - Under baseline conditions, it is anticipated that bonytail in the Colorado River Basin and their designated critical habitat would continue to be protected under the ESA. Reclamation has consulted with the Service under Section 7 of the ESA on the operation of Glen Canyon and Hoover dams. The resulting biological opinions will remain in effect. Reservoir operations remain within historical ranges, and efforts to protect, recover, and monitor the species status would continue.

The main effort to protect and conserve bonytail in the Lower Basin is the reintroduction of fingerling bonytail from the Dexter National Fish Hatchery, New Mexico that have been reared in predator-free ponds into Lake Mohave by the NFWG. The primary limiting factor for bonytail under existing habitat conditions is predation of early life stages by non-native species. This program is designed to address predation and maintain genetic stocks of bonytail. The main efforts to protect and conserve bonytail in the Upper Basin are conducted through the Upper Colorado Recovery Implementation Program (UC-RIP). This program is designed to recover the bonytail in the Upper Basin by 2010.

Colorado pikeminnow - Under baseline conditions, it is anticipated that Colorado pikeminnow would continue to be restricted to the Upper Basin. Colorado pikeminnow and their designated critical habitat would continue to be protected under the ESA. The Colorado pikeminnow is extirpated from all areas considered in this analysis except for Lake Powell. The ability of the Colorado pikeminnow to successfully reproduce in Lake Powell has not been confirmed. Successful spawning occurs in riverine habitats above Lake Powell, and larvae then drift downstream to rear in sheltered environments. Survival of larvae that drift into Lake Powell is limited by predation by non-native fish. As development of water continues to occur in the upper basin, lower lake elevations are expected to occur. This will increase the amount of sheltered riverine habitat and indirectly benefit the survival of some larvae by preventing them from drifting into open water areas of the reservoir where the risk of predation is greater. The main efforts to protect and conserve Colorado pikeminnow in the Upper Basin are conducted through the UC-RIP, plus the San Juan River Basin Recovery Implementation Program (SJ-RIP). This program is designed to recover the pikeminnow in the Upper Basin by 2010.

Flannelmouth sucker - Under baseline conditions, it is anticipated that flannelmouth sucker populations in the project area would continue to be found in riverine habitats and tributaries. The species is not well adapted to reservoir habitats and are seldom found there. The low survival of eggs and larvae in the reservoirs may be attributed to impacts from cold water temperatures or predation by non-native species. These conditions would continue to limit the reproductive success of flannelmouth sucker in the reservoirs. For flannelmouth sucker that spawn in rivers upstream of Lake Mead and Lake Powell or other inflow areas, survival of larvae that drift into the reservoirs is limited by cold water temperatures and predation of non-native fish. Lower lake

elevations may increase the amount of sheltered riverine habitat and indirectly benefit the survival of some larvae by preventing them from drifting into open water areas of the reservoir where the risk of predation is greater. Efforts to improve habitat conditions under the UC-RIP, SJ-RIP, Glen Canyon Dam AMP and the Lower Colorado MSCP will benefit the flannelmouth sucker.

Humpback chub - Under baseline conditions, it is anticipated that humpback chub populations would continue to be restricted to riverine and tributary habitats in the Colorado River in the Grand Canyon. The humpback chub and its designated critical habitat would continue to be protected under the ESA, the 1996 ROD, flow regimes and other activities as prescribed under the 1995 biological opinion and the Glen Canyon Dam AMP. In addition to the populations of the Grand Canyon, there are five stable populations in the Upper Basin. The UC-RIP and SJ-RIP are making progress toward recovery of the species. The humpback chub is considered extirpated from all other areas within the lower Colorado River Basin.

Razorback sucker - Under baseline conditions, it is anticipated that razorback sucker populations in the Lower Basin would continue to be limited primarily to Lake Mead and Lake Mohave and designated critical habitat would continue to be protected under the ESA. Spawning success has been limited by predation of eggs and larvae by non-native fish. Efforts are currently being made by the NFWCT to supplement adult breeding populations of razorback suckers by stocking lakes and the river with young reared in predator free ponds. Operations at Lake Mohave are conducted in an effort to conserve and protect razorback sucker by controlling the amount of lake fluctuation during the spawning season. A five-year study of the remnant razorback sucker population in Lake Mead is scheduled to be completed by 2002. These practices are expected to continue under baseline conditions and all the interim surplus criteria alternatives.

3.8.4.3.2 Effects of the Alternatives

Potential effects on the five special-status fish species discussed above would be similar to baseline conditions. Each alternative would result in Lake Powell and Lake Mead surface elevations that would vary from those under baseline conditions, with the Flood Control Alternative resulting in slightly higher reservoir elevations, and the Basin States, Six States, California and Shortage Protection alternatives having lower reservoir elevations as compared to baseline projections. (Section 3.3 discusses the modeling results concerning potential future reservoir elevation trends in detail.) Efforts toward protection and recovery of these species would continue under each of the alternatives in the same manner as describe above for baseline conditions. Potential changes in BHBF and low steady summer flow frequencies are discussed in Section 3.6 of this FEIS, and Reclamation has determined that these effects would not be likely to adversely affect special-status fish species.

3.9 RECREATION

3.9.1 INTRODUCTION

The Colorado River, Lake Mead and Lake Powell provide water-based recreation opportunities that are of local, regional and national significance, as well as international interest.

This recreation analysis addresses five specific recreation-related issues associated with potential effects that could result from implementation of the interim surplus criteria alternatives considered in this document. The issues addressed are potential effects to:

- Reservoir marinas and boat launching and shoreline access for Lake Powell and Lake Mead;
- Lake Mead and Lake Powell boating and navigation;
- River and whitewater boating;
- Sport fishing in Lake Powell, Lake Mead and the Colorado River below Hoover Dam; and
- Recreational facilities operational costs.

The interim surplus alternatives would not change the current and projected operations of Lakes Mohave and Havasu and thus would not affect recreation on those reservoirs.

3.9.2 RESERVOIR MARINAS, BOAT LAUNCHING AND SHORELINE ACCESS

This section considers potential effects of the interim surplus criteria alternatives on Lake Powell and Lake Mead marinas, boat launching facilities and other important shoreline access areas.

3.9.2.1 METHODOLOGY

Information in this section was compiled after review of available published and unpublished sources, and through personal communication with Reclamation, NPS and resource specialists. Thorough review of existing literature on the Colorado River provided information on reservoir recreation use for both Lake Powell and Lake Mead. Where available, the number of facilities at each marina, boat launching ramp and shoreline access area are included.

From the information compiled, representative threshold pool elevations were selected for facilities, at or below which certain facilities may be rendered inoperable or relocation of facilities could be required to maintain their operation. These thresholds

were chosen based on either information provided in studies, communications with NPS personnel, or from comments received regarding the DEIS. Discussions of the probabilities of these thresholds occurring is detailed in the Environmental Consequences Section (Section 3.9.2.3). The probability of reservoir elevations occurring below these levels under baseline conditions and the action alternatives was identified using river system modeling as described in Section 3.3.

Data generated from the river system model include the probability (represented graphically in the Environmental Consequences section) that the water level related to each alternative would be above the specified "threshold" pool elevations for each year during the period of analysis. The graphs indicate the general trend of elevation probabilities and present the incremental differences in probabilities for baseline conditions and each of the alternatives.

3.9.2.2 AFFECTED ENVIRONMENT

Recreational boating on Lake Mead and Lake Powell is dependent upon access to the water via shoreline facilities such as marinas, docks and launch ramps. Fluctuation in water levels is a normal aspect of reservoir operations, and facilities are designed and operated to accommodate it. However, decreased pool elevations or increased variations or rates in pool elevation fluctuation could result in increased operation costs, temporary closures or possibly permanent closures.

Reservoir pool elevations at Lake Powell and Lake Mead depend on annual inflow from the Colorado River upstream, and outflow from the respective dam to the Colorado River downstream for water deliveries. Operation of the Colorado River generally results in the highest pool elevations in Lake Powell in mid-summer and in Lake Mead, early winter. In general, pool levels in Lake Powell and Lake Mead tend to fluctuate on an annual cycle rather than on a monthly or seasonal cycle. Lake Powell historical pool fluctuations have normally ranged from 20 to 25 feet per year (Combrinks and Collins, 1992). Since operation of Glen Canyon Dam began in 1966, Lake Mead pool fluctuation has normally ranged from 5 to 25 feet per year.

3.9.2.2.1 Lake Powell Recreation Resources

Lake Powell is located in the Glen Canyon National Recreation Area (GCNRA) in southern Utah and northern Arizona. Typical recreation activities that occur at Lake Powell include swimming and sunbathing, power boating, fishing, off-beach activities associated with boat trips (such as hiking and exploring ruins), house boating, personal water craft use, canoeing, kayaking, sailing, and other activities (USBR, 1995b). A carrying capacity study (NPS, 1991) provided information on the potential limits of boater use on Lake Powell. The study also showed that the average length of stay at the GCNRA is 4.5 days.

Visitation numbers for the entire GCNRA between 1990 and 1999 are provided in Table 3.9-1. The data indicate that there are seasonal variability in recreation use. The majority of use occurs in the summer months of June, July and August. The visitation numbers shown for 1995 through 1999 are considerably lower than visitation between 1990 and 1994 due to changes in NPS methods for calculating visitation. However, the seasonal pattern of visitation does not change; use remains highest in summer months. The majority of visitors to the GCNRA travel either less than 30 miles to visit (29.1 percent) or travel 121 to 240 miles (28.9 percent). This indicates that the area is used predominantly by local and regional visitors.

Table 3.9-1
Glen Canyon National Recreation Area Visitation

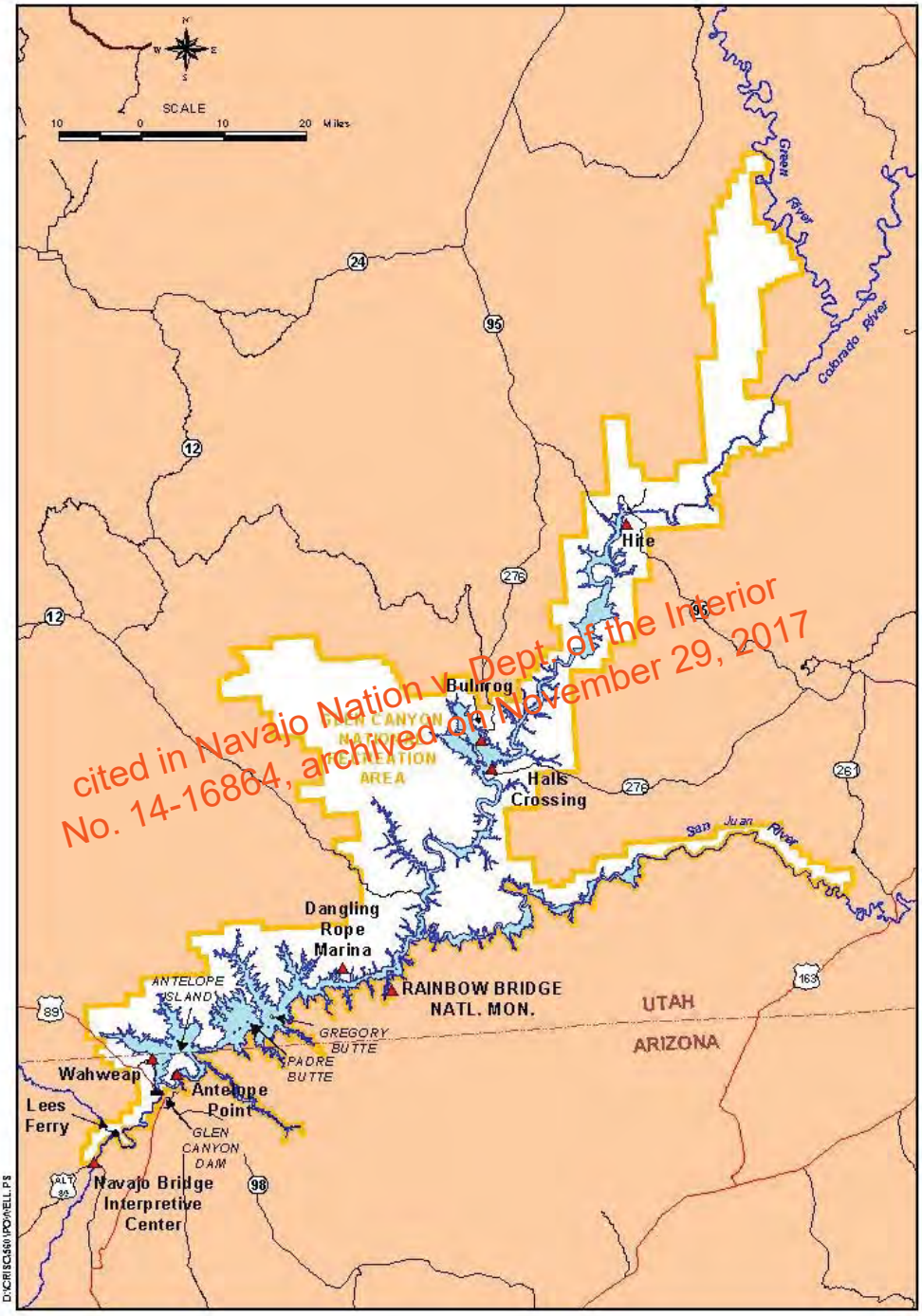
Year	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Total
1990	77,617	109,042	135,039	253,638	289,993	501,288	467,981	483,023	350,026	227,061	129,691	78,750	3,103,129
1991	81,875	97,120	118,182	199,462	346,764	451,674	503,752	568,030	396,785	247,982	120,822	78,442	3,210,890
1992	83,044	114,889	139,787	246,993	346,727	525,610	572,869	659,809	478,032	245,565	122,386	82,847	3,620,558
1993	60,927	83,903	123,836	201,141	372,425	526,202	624,549	644,534	530,550	259,119	111,607	76,031	3,470,194
1994	69,663	120,307	174,272	264,265	364,826	576,355	665,583	439,177	321,961	212,729	99,097	63,607	3,371,842
1995*	35,814	66,553	88,414	151,369	196,905	410,610	435,840	461,431	285,118	192,597	94,508	50,362	2,469,521
1996	41,303	50,553	96,296	209,243	231,655	419,288	447,417	442,180	268,266	187,949	89,670	48,269	2,532,087
1997	49,954	54,401	115,523	157,249	245,000	288,742	420,927	437,846	266,992	187,467	85,595	48,507	2,458,203
1998	39,241	55,538	89,971	171,234	267,509	389,167	445,423	398,776	285,105	197,673	77,247	50,315	2,467,199
1999	44,755	51,657	118,141	155,831	261,981	426,744	515,041	441,791	305,006	200,457	89,799	55,503	2,667,249

Source: Based on NPS data.

* NPS methods for calculating visitation numbers changed in 1995. This resulted in significant reductions in visitation numbers compared to prior years.

Recreation boating is the largest type of boating activity on Lake Powell, with an estimated 1.5 million boater nights per year in 1988. Although use at some of the major marinas, such as Wahweap, Hall's Crossing and Bullfrog, decreased during a low water period in 1989, the total number of boats on Lake Powell was reported to have increased 14.5 percent by July 31, 1989, compared to the same period in 1988 (USBR, 1995b). Specific facilities and reservoir elevations important to their operation are discussed in the following sections. Map 3.9-1 depicts Lake Powell and the locations of shoreline facilities.

Map 3.9-1
Lake Powell and Associated Shoreline Recreation Facilities



3.9.2.2.2 Shoreline Public Use Facilities

Public use facilities at Lake Powell that include water-based recreation activities are Wahweap, Dangling Rope Marina, Halls Crossing, Bullfrog, Hite, and Antelope Point. The GCNRA Proposed General Management Plan (NPS, 1979) describes the estimated capacity and development at these areas; these estimates are based on general concepts only and further detailed planning was proposed to begin after the plan's acceptance in 1979. Table 3.9-2 summarizes the activities at each of the sites. If the actual number of improvements (boat slips, mooring buoys, houseboats, etc.) at a facility are known, it is listed in Table 3.9-2; otherwise, the presence of an improvement is indicated with a bullet (•). If an improvement does not exist, it is denoted with "N/A." Below is a description of the shoreline public use facilities at Lake Powell.

Wahweap – The facilities at Wahweap are the closest to Glen Canyon Dam, located off Interstate 89 at the mouth of Wahweap Bay. According to a study that addressed fluctuating lake levels and recreation use, the Stateline Launching Ramp at Wahweap became inoperable in 1989 when the lake elevation decreased to below 3677 feet msl (Combrink and Collins 1992). In 1993, NPS extended the Wahweap and Stateline boat ramps down to an operable level of 3612 feet msl (Henderson, 2000).

Dangling Rope Marina – The facilities at Dangling Rope Marina were proposed to replace the facilities at Rainbow Marina in Forbidding Canyon. All the facilities float, and they are only accessible by boat (NPS, 1979). In addition to the facilities, tour boats depart from Dangling Rope Marina for visits to Rainbow Bridge National Monument during the recreation season (NPS, 1993). There are no known reservoir surface elevations that would impair operation of this facility.

Halls Crossing – The facilities at Halls Crossing are located off Utah Highway 276 on the east shore of Lake Powell, across the bay from Bullfrog Marina. According to a study that addressed fluctuating lake levels and recreation use, the Halls Crossing Ferry Ramp became inoperable in 1989 when the lake elevation decreased to below 3675 feet msl (Combrink and Collins, 1992). In 1993, NPS extended the boat ramp down to an operable level of 3612 feet msl (Henderson, 2000).

Bullfrog – The facilities at Bullfrog are located midway up Bullfrog Bay, off of Utah Highway 276 and across the bay from Halls Crossing. According to a study that addressed fluctuating lake levels and recreation use, the Bullfrog Ferry Ramp became inoperable in 1989 when the lake elevation decreased to below 3675 feet msl. In addition, the Bullfrog Utility Service became inaccessible when the lake elevation decreased to below 3670 feet msl (road access was also unavailable at the slips) (Combrink and Collins, 1992). In 1993, NPS extended the boat ramp down to an operable level of 3612 feet msl (Henderson, 2000).

Table 3.9-2
Lake Powell Shoreline Public Use Facilities

Facility	Wahweap	Dangling Rope Marina	Halls Crossing	Bullfrog	Hite	Antelope Point *
Lodging (rooms)	375	N/A	20	56	5	200-225
Restaurant/Snack Bar	2/1	N/A/1	•/1	1/1	N/A	•
Tour boats	9	N/A	N/A	1	N/A	2
Boat slips	870	N/A	165	254	6	250-300
Mooring buoys	180	N/A	141	220	54	N/A
Rental houseboats	175	N/A	89	112	21	60
Rental small boats	150	N/A	44	50	27	60
Dry storage	450	N/A	230	750	109	•
RV park (spaces)	120	N/A	32	24	N/A	150
Marina campstore	1	1	1	1	N/A	1
Store	•	•	1	1	1	1
Boat repair	•	•	•	•	N/A	N/A
Service station	•	•	gas	•	gas	•
Parking (spaces)	2,500	N/A	300	1,575	150	220
Campground (sites)	215	N/A	64	100	6	•
Picnic (sites)	124	N/A	20	50	N/A	N/A
Day use beaches/trails	N/A	N/A	N/A	N/A	N/A	•
Launching ramps	2	N/A	1	1	1	1
Airstrip	N/A	N/A	N/A	3,500-foot, paved	2,100-foot, paved	N/A
Visitor center, cultural center	•	N/A	N/A	N/A	N/A	•
Ranger station	•	N/A	•	•	N/A	•
Employee housing	•	•	•	N/A	•	•
Concessionaire quarters	80	N/A	30	40	10	N/A
Dorm units	119	6	24	96	0	N/A
Capacity (use per day)	7,800-10,100	2,400-3,100	3,400-4,400	7,900-10,300	2,500-3,300	N/A

Source: NPS 1979. Proposed General Management Plan and personal communication, Norm Henderson, NPS, 2000.

• indicates presence of an improvement.

N/A not applicable – indicates no improvement.

* Facilities shown are proposed. Existing facilities include an entrance station, gravel parking area, two permanent toilets, and a boat ramp. The Navajo Nation and NPS are in the process of developing the site.

Hite – The facilities at Hite are located off of Utah Highway 95. According to a study that addressed fluctuating lake levels and recreation use, the Hite Launching Ramp became inoperable in 1989 when the lake elevation decreased to below 3677 feet msl (Combrink and Collins 1992). In 1993 NPS extended the boat ramp down to an operable level of 3612 feet msl. However, the ramp area is known to be useable down to 3630 feet msl (Henderson, 2000).

Antelope Point – The facilities at Antelope Point are located off of Arizona Highway 98 on the southern side of Lake Powell. Development of Antelope Point only began recently, and data on visitation has not been collected on a formal basis. Existing facilities at the site consist of an entrance station where fees are collected, two permanent toilets, a large gravel parking area that can accommodate 220 vehicles, and a public boat ramp. The Navajo Nation, in conjunction with NPS, has plans to develop the site as a resort destination, and is in the process of selecting a master developer for the project. Facilities proposed for the site in the Development Concept Plan are listed in Table 3.9-2, above.

The existing boat ramp at Antelope Point currently extends down to 3677 feet msl. NPS provided Reclamation with construction drawings for extending the boat ramp down to 3620 feet msl as water elevation declines. The extended boat ramp would allow houseboats and other watercraft to launch down to elevations around 3625 feet msl, assuming about 5 feet of free board (Bishop, Personal Communication, 2000). NPS also provided Reclamation with a preliminary Antelope Point Marina layout drawing for reservoir elevation of 3600 feet msl; but it has not been established that a marina would be operable at this level.

Rainbow Bridge National Monument – The Rainbow Bridge National Monument is located on the south shore of Lake Powell and is bounded on three sides by the Navajo Reservation near the Utah/Arizona border. The facilities at the monument include courtesy docks, restrooms, a floating walkway, and a floating interpretive platform. Trails from the dock lead to viewing areas. One viewing area is used when Lake Powell is below the full-pool elevation of 3700 feet msl, and the other is used when the reservoir is at full-pool elevation. The docks and trail system are designed to accommodate lake level fluctuations allowed in the operation of Glen Canyon Dam and powerplants (from 3490 feet msl to 3700 feet msl) (NPS, 1993). If the lake levels fall below 3650 feet msl, the dock facilities would be moved and the old land trail through Bridge Canyon (submerged at full pool) would be hardened and used for access. The floating walkway and interpretive platforms would be removed and stored. The courtesy docks would be connected to the land trail with a short walkway (NPS, 1990). However, large quantities of silt that have been deposited where Bridge Creek flows into Lake Powell could create access problems at low water surface elevations. The large silt flats are difficult to cross with floating walkways; special construction techniques may be required to bridge these areas. At some lake elevations, it may be infeasible to maintain water access to the monument (NPS, 1993); however, the specific elevation is not known.

When Lake Powell is operated below 3700 feet msl, some of the Rainbow Bridge National Monument is within a high hazard flash flood area. The 100- and 500-year flood elevations in Bridge Creek are estimated to be 7.5 feet and 10 feet above the creek channel, respectively. For the area well upstream of Lake Powell, the trail follows the creek and is above both the 100- and 500-year floodplains. However, the trail route in the transition zone between the reservoir and creek, along the lake's edge, could be subject to water surface elevation increase, surface turbulence, and significant velocities, depending on the lake elevation at the time of flooding and the magnitude of the flood. For the lake itself, there would be little or no discernable water surface increase and the turbulence would be limited. When Lake Powell is at full operating pool, flash flood areas are well upstream of the reservoir, in the Bridge Creek Canyon drainage outside the monument.

The General Management Plan for Rainbow Bridge includes a Flash Flood Mitigation Plan. In the event of combined low pool elevations and flash flood conditions, there are four components of the mitigation plan that would be put in place. These components include: 1) a wayside exhibit with information to inform visitors of possible flash flood hazards; 2) additional signage in the flood hazard zones to alert visitors where to move in case of a flood; 3) identification of evacuation and emergency measures, including chain of command responsibilities, emergency supply locations, and support facilities; and 4) installation of a warning system that would alert visitors to evacuate.

Prior to the construction of Glen Canyon Dam, access to the area was primarily by foot. Since the creation of Lake Powell, access is now primarily by water, although the area is also accessible by trails through Navajo Mountain. Access to the monument is restricted during the recreation season in accordance with the monument's carrying capacity of 200 people at one time. In addition, access is limited daily during certain times of the day. Boat tours to the monument are allowed during the busier time of the day and originate at Dangling Rock Marina. All tours have an NPS interpreter on board to convey the monument's significance. Access during quieter times of the day is limited to five to eight private boats. During the off-season, access to the monument is unrestricted except that boat tours are managed to ensure that only one tour boat at a time is present at the monument (NPS, 1993).

3.9.2.2.2.1 Threshold Elevations

From the information presented above on reservoir pool elevations, three elevations, 3677 feet msl, 3626 feet msl and 3612 feet msl, were identified as representative threshold elevations below which shoreline facilities at Lake Powell could be affected.

The existing boat ramp at Antelope Point extends down to elevation 3677 feet msl. This elevation is identified as one of the threshold elevations for the analysis of marinas and boat ramps at Lake Powell. As discussed above, the extended boat ramp would be operable down to 3625 feet msl. The elevation of 3626 feet msl is discussed in the boating navigation and safety section (Section 3.9.3.3.1) and is considered to be

representative of the threshold elevation for the extended boat ramp. Since the minimum reservoir elevation at which the Antelope Point Marina would be operable has not yet been established, the threshold elevations of 3626 feet msl (discussed above) and 3612 feet msl (discussed below) are assumed to apply to a future marina at Antelope Point.

As discussed above, the boat ramps at Wahweap, Halls Crossing, Bullfrog, and Hite are designed to operate down to 3612 feet msl. It is not known what adjustments and capital improvement costs would be required if elevations were to decline to below 3612 feet msl. As such, 3612 feet msl is used in this analysis as the lower threshold elevation for marinas and boat ramps at Lake Powell.

The threshold elevations of 3677 feet msl, 3626 feet msl and 3612 feet msl are used to evaluate baseline conditions and the effects of interim surplus criteria alternatives on shoreline facilities at Lake Powell in the Environmental Consequences section (Section 3.9.2.3.1). The threshold elevation of 3626 feet msl is evaluated in Section 3.9.3.3.1.

3.9.2.2.3 Lake Mead Recreation Resources

Lake Mead, the reservoir created by the construction of Hoover Dam, is located in the Lake Mead National Recreation Area (LMNRA) in southern Nevada and northern Arizona. The LMNRA contains 1.5 million acres and encompasses the 100-mile-long Lake Mead, 67-mile-long Lake Mohave, the surrounding desert, and the isolated Shivwits Plateau in Arizona. At a full pool elevation of approximately 1210 feet msl, Lake Mead's surface area is 153,235 acres, the storage capacity is 25.9 maf and there are 695 miles of shoreline (USBR, 1996b). Lake Mead is the largest man-made lake in the Western Hemisphere.

LMNRA receives approximately ten million visitors annually. Typical water-based recreation activities that occur on Lake Mead include: swimming, boating, houseboating, fishing, sailboarding, paddlecraft use, scuba diving (USBR, 1996b). On average, the majority of boats are personal watercraft. There may be as many as 6000 boats combined on Lake Mead and Lake Mohave during a peak recreation use weekend. At Boulder Beach, which is located near the urbanized area of Las Vegas and surrounding communities, the personal watercraft percentage may be as high as 50 percent.

3.9.2.2.4 Shoreline Public Use Facilities at Lake Mead

Six marinas at Lake Mead provide boat launching facilities as well as slips and storage, fuel and boat launches. In addition, there are three boat ramps without associated marinas and one site without a boat ramp. The marinas include Boulder Beach, Las Vegas Bay, Calville Bay, Echo Bay, Overton Beach and Temple Bar. The boat ramps are located at Hemenway, Government Wash and South Cove. Pearce Ferry has no

boat ramp and is used as a take out by private and commercial boaters that kayak and raft the Colorado River into Lake Mead. Facilities at the six marinas are summarized in Table 3.9-3, and all of the sites are described below. If the actual number of improvements (boat slips, etc.) at the facility is known, it is included in the table; otherwise, the presence of an improvement is indicated with a bullet (•). If there are no facilities at a location, this is indicated with an "N/A" for "not applicable." Map 3.9-2 shows the locations of both developed and undeveloped sites on Lake Mead.

Table 3.9-3
Lake Mead Marina Public Use Facilities

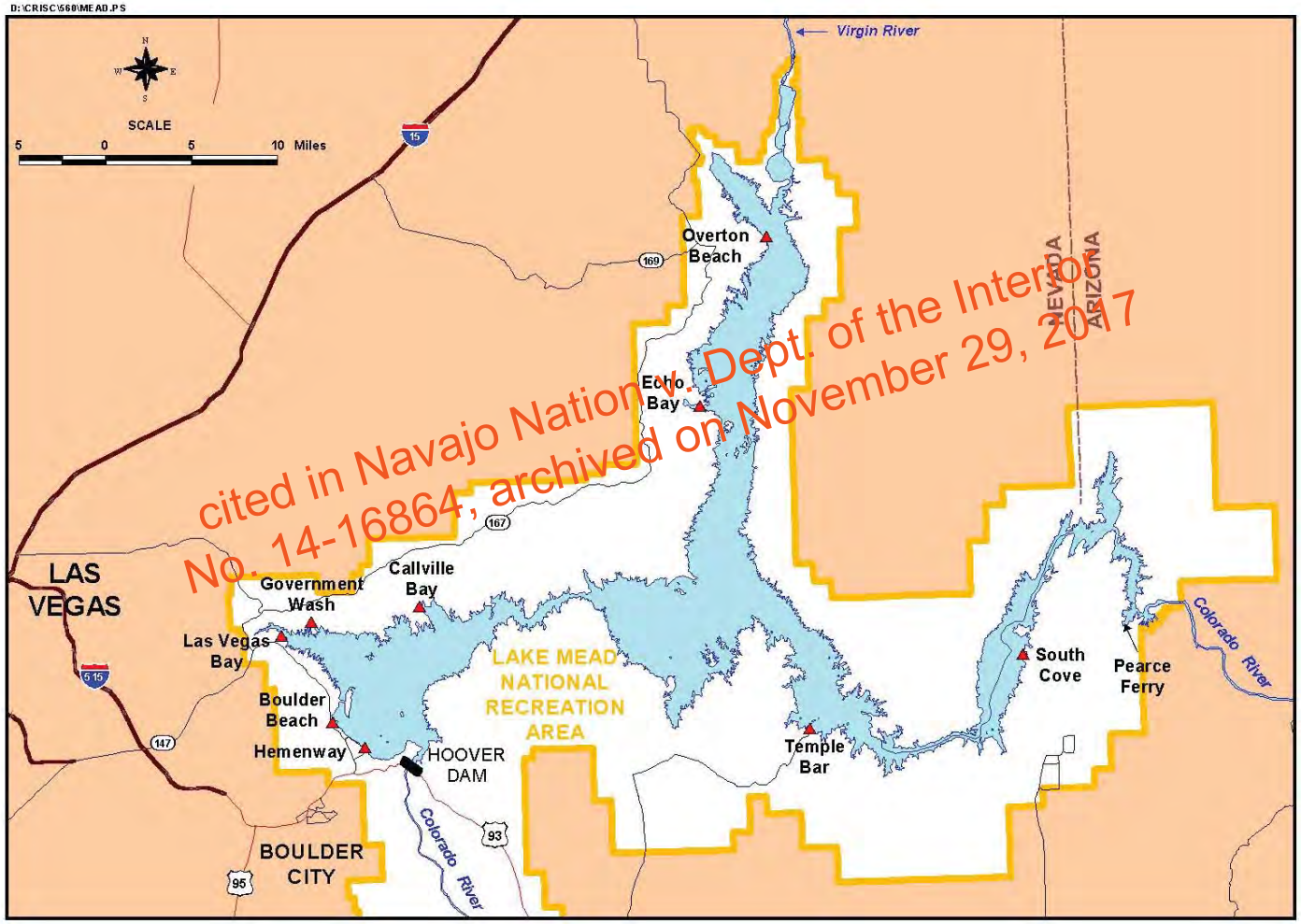
Facility	Boulder Beach/ Lake Mead Marina	Las Vegas Bay	Calville Bay	Echo Bay	Overton Beach	Temple Bar
Lodging	•	N/A	N/A	•	N/A	•
Restaurant	•	•	•	•	•	•
Tour boats	•	N/A	N/A	N/A	N/A	N/A
Marina (boat slips)	750	•	650	320	•	•
Mooring buoys	N/A	N/A	N/A	N/A	N/A	N/A
Rental houseboats	N/A	N/A	•	•	N/A	N/A
Rental small boats	•	N/A	N/A	•	N/A	•
Dry storage	•	•	•	•	•	•
RV Park (spaces)	N/A	N/A	N/A	58	N/A	7
Trailer village	•	N/A	•	69	•	111
Trailer sewage dump	•	N/A	•	•	•	•
Grocery/gift store	•	•	•	•	•	•
Gasoline/Propane	•	N/A	•	•	•	•
Boat sewage dump	•	•	•	•	•	•
Parking (spaces)	N/A	N/A	N/A	N/A	N/A	N/A
Campground (sites)	154	89	80	166	N/A	153
Picnic (sites)	•	•	•	N/A	N/A	N/A
Showers	•	N/A	•	•	•	•
Launching ramps	•	•	•	•	•	•
Airstrip	N/A	N/A	N/A	•	N/A	•
Ranger station	•	•	•	•	•	•
Self-service laundry	•	N/A	•	•	•	•
Capacity (use per day)	N/A	N/A	N/A	N/A	N/A	N/A

Source: NPS, 1995

• indicates presence of an improvement

N/A not applicable – indicates no improvement

Map 3.9-2
Lake Mead and Associated Shoreline Recreation Facilities



Recreation boating is very popular at Lake Mead, and the shoreline public use facilities are associated with boating use. Most of the facilities shown in the Table 3.9-3 were designed to operate at full pool. However, NPS has determined costs associated with adjusting facilities based on lowered lake elevations. These facilities are out of their normal operating range at pool elevations of 1180 feet msl, requiring sizable capital expenditures to restore them to working order. In addition, there are additional costs associated with any 20-foot drop below this level.

Hemenway – The boat ramp facility at Hemenway is the closest to Hoover Dam and is located off Nevada Highway 166. There is one courtesy dock and a parking area (Henderson, 2000). In addition, campgrounds and a group campground are located at Hemenway. The group campground is for self-contained vehicles, such as trailers and motor homes. There are no restrooms or tables.

Boulder Beach – The facilities at Boulder Beach are located off of Lakeshore Scenic Drive, just off of Nevada Highway 167 outside of Boulder City, Nevada, and include restrooms, tables and grills. There is also a group campground at Boulder Beach for tent camping only with limited vehicle parking.

Las Vegas Bay – The facilities at Las Vegas Bay are located off Lakeshore Scenic Drive, just off Lake Mead Drive (Nevada Highway 167). According to a marina worker, when the lake elevation drops below 1190 feet msl, the boat ramps and floats have to be readjusted.

Government Wash – The boat ramp facility at Government Wash is located off Nevada Highway 167. There is one courtesy dock and a parking area (Henderson, 2000).

Calville Bay – The facilities at Calville Bay are located off Nevada Highway 167 on the north shore of Lake Mead, midway up Calville Bay.

Echo Bay – The facilities at Echo Bay are located off Nevada Highway 167, midway up Overton Arm.

Overton Beach – The facilities at Overton Beach are located off Nevada Highway 169, near the top of Overton Arm.

South Cove – The boat launching facilities at South Cove are located off Aztec Wash, which is off Interstate 93 in Arizona. There is one courtesy dock, picnic facilities, and unpaved parking (Henderson, 2000). In addition, there is an airstrip approximately four miles from the facilities at South Cove (Henderson, 2000).

Temple Bar – The facilities at Temple Bar are located on the south shore of Lake Mead at the end of an unnamed road off Interstate 93 in Arizona.

Pearce Ferry - This area is located near Aztec Wash, which is off Interstate 93 in Arizona at the eastern end of the LMNRA. The area is a large, gravel wash with a

gentle slope down to the water. Vehicles are driven down to the water's edge to load rafts and other small boats. There is parking and a year-round portable toilet, and primitive camping is allowed. There are no ramps, docks or other developed facilities at the site.

The Hualapai River Runners are one of the commercial guide services that use Pearce Ferry as a take out. The River Runners conduct guided whitewater trips that put in at Diamond Creek, and float trips that put in at Quartermaster Canyon. All of these trips take out at Pearce Ferry.

Comments from the Hualapai Tribe on the Draft EIS identified a Lake Mead pool elevation of 1183 feet msl as a threshold elevation for accessing the Pearce Ferry takeout. At this elevation and below, the river subdivides into smaller channels and large areas of silt and mud are exposed, prohibiting access to the take out.

When Pearce Ferry is inaccessible as a takeout, boaters must continue downstream to South Cove, an additional 16 miles. This costs river runners fuel (for motorized craft), time (one to two more hours on the river) and possible safety problems (due to fatigue). For commercial boaters, the additional travel time to South Cove can also result in lost business by preventing guides from meeting river tour schedules.

3.9.2.2.4.1 Threshold Elevations

The description of facilities above identifies several pool elevations where facilities or access to facilities would be affected. At Las Vegas Bay, 1190 feet msl was identified as an elevation at which facilities would require adjustment, but would continue to be operable. Elevation 1180 feet msl was identified by the NPS as the elevation at which most other developed facilities would require capital expenditures, rather than just an adjustment, in order to maintain operation. Elevation 1183 feet msl was identified by the Hualapai Tribe in their comments on the DEIS as a threshold elevation for using the undeveloped Pearce Ferry site as a takeout for rafts and other whitewater boats.

The DEIS evaluated the consequences of elevation 1180 feet msl for facilities at Lake Mead (Section 3.9.2.3.2). In response to the Hualapai Tribe's comment on the DEIS regarding the threshold elevation of 1183 for Pearce Ferry, this FEIS evaluates the consequences of 1183 feet msl instead of 1180 feet msl. Therefore, 1183 feet msl is used as a representative threshold elevation for shoreline facilities and public access at Lake Mead and is used in the Environmental Consequences section (Section 3.9.2.3.2) to evaluate the effects of baseline conditions and interim surplus criteria alternatives on shoreline facilities and public access at Lake Mead.

3.9.2.3 Environmental Consequences

Recreational boating on Lake Mead and Lake Powell is dependent upon access to the water via public shoreline facilities such as marinas, docks and boat ramps, as well as

undeveloped launch areas. Some fluctuation in water level is a normal aspect of reservoir operations, and facilities are designed and operated to accommodate it. However, decreased pool elevations or increased variations or rates in pool elevation fluctuation could result in increased operation costs, facility improvements, temporary closures, or possibly permanent closure of shoreline facilities.

As lake levels fluctuate, developed facilities must be adjusted accordingly. This could require moving and relocating docks, extending utility lines associated with shoreline facilities, increasing sewage pump capacity, reducing pressure on water supply lines to boats, adjusting and relocating buoys, moving breakwater barriers and channel markers, and extending launch and dock ramps (Combrink and Collins, 1992). If lake fluctuations exceed 25 feet, special adjustments to lake facilities would be necessary, including the relocation of anchors and the extension or reduction of utility lines and cables that provide utility service to floating facilities (Combrink and Collins, 1992).

In addition, if developed facilities are temporarily or permanently closed or relocated, or undeveloped sites are no longer accessible, there may be associated increases in reservoir boating congestion or longer wait times at sites that remain open. This could have an effect on boating satisfaction. The cost of relocating developed facilities in response to changes in reservoir pool elevations is discussed in Section 3.9.6.

3.9.2.3.1 Lake Powell

As discussed in the Affected Environment section above, pool elevations of 3677 feet msl and 3612 feet msl were identified as representative thresholds that are problematic for shoreline facilities at Lake Powell. Elevation 3677 feet msl was identified as a threshold elevation for the existing Antelope Point, and the NPS identified 3612 feet msl as a threshold for several other facilities. These are elevations below which facility adjustments or capital improvements would be required.

There are two other threshold elevations not treated directly below. Elevation 3626 feet msl has also been defined as a threshold elevation for the design boat ramp at Antelope Point. This elevation is discussed in Section 3.9.3.3.1. Facilities at Rainbow Bridge would be affected by pool elevations of 3650 feet msl or below, as described above in Section 3.9.2.2. Although specific probabilities of remaining above elevation 3650 feet msl were not determined, the probabilities that lake elevations would remain above 3650 feet msl would be between the probabilities for the threshold elevations of 3677 and 3612 feet msl, which are discussed below.

Figure 3.9-1 provides an overview of the differences in end-of-July water surface elevation trends under baseline conditions and the action alternatives over the period of analysis.

Figure 3.9-2 and Table 3.9-4 indicate the probability of Lake Powell elevation exceeding the threshold of 3677 feet msl in July. The probability would decrease the

Figure 3.9-1
Lake Powell End of July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
90th, 50th and 10th Percentile Values

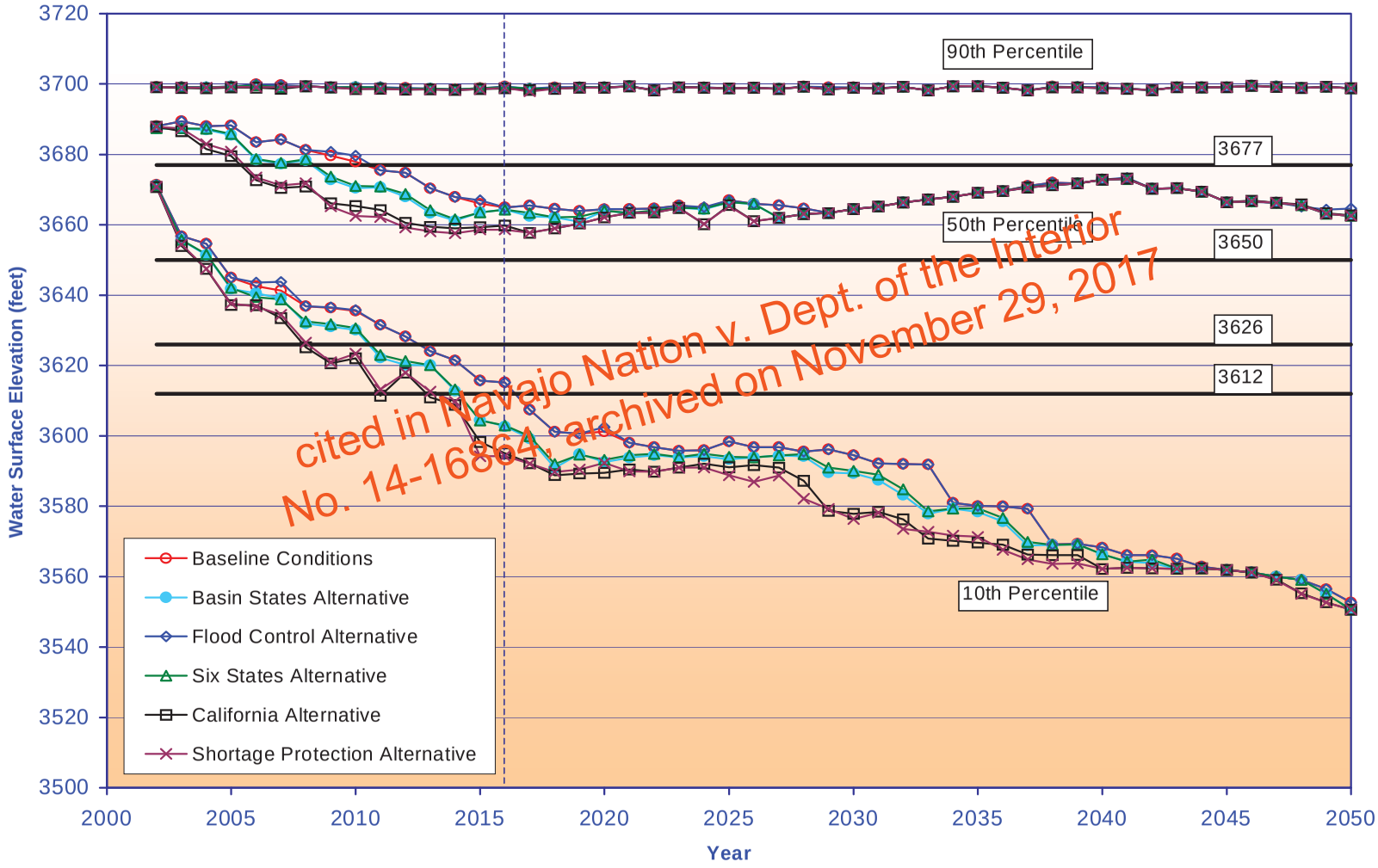
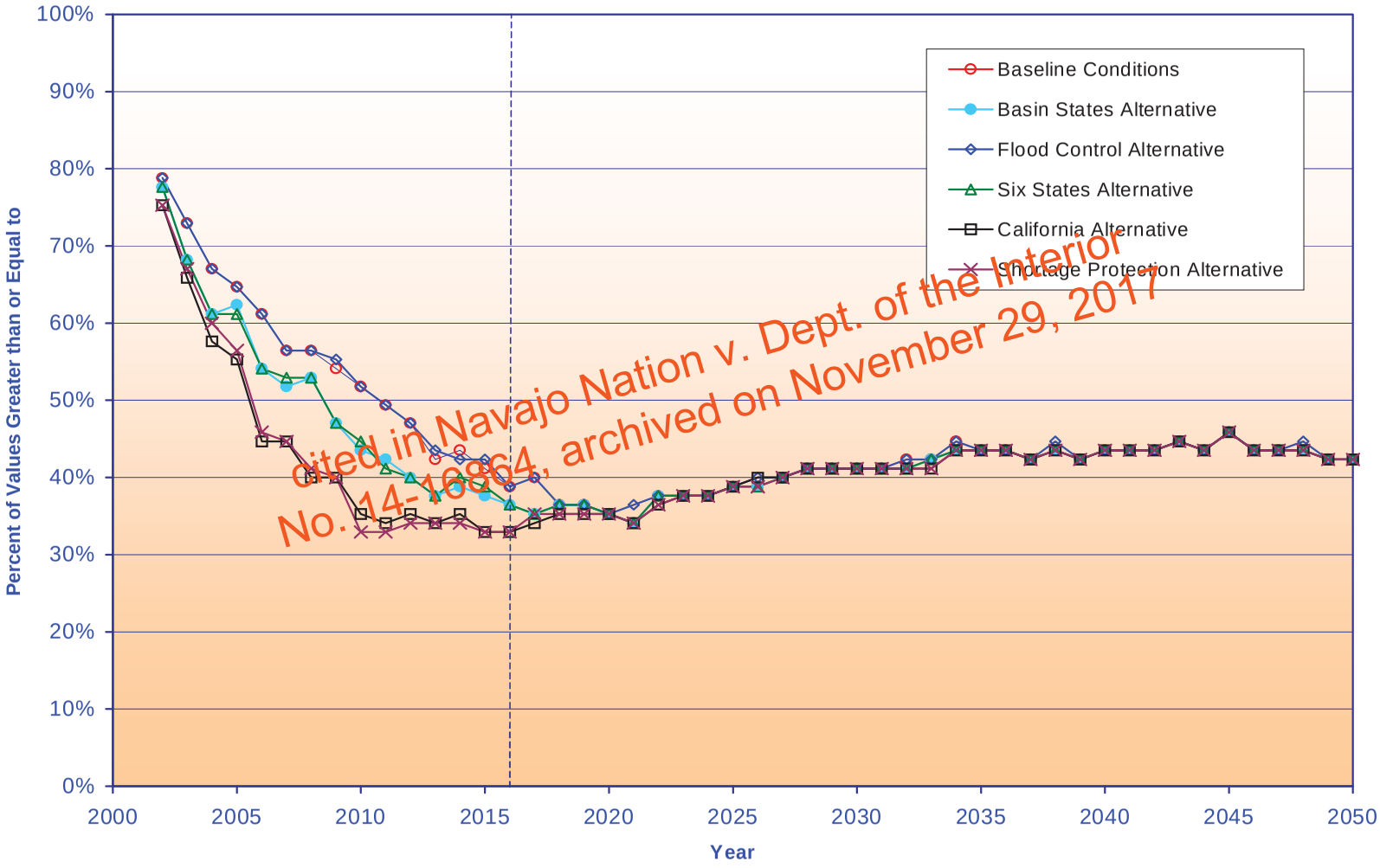


Figure 3.9-2
Lake Powell End of July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percent of Values Greater than or Equal to 3677 Feet msl



most over the initial 15 years of the period of analysis. During this time, the probability would decline from nearly 80 percent to less than 40 percent under baseline conditions and the alternatives. During years 16 through 25 the effects of the alternatives would diminish, although the probability of exceeding elevation 3677 feet msl would remain low (roughly 30-40 percent). After year 25 there would be no discernable effect of the alternatives for the remainder of the analysis period; the probability of exceeding elevation 3677 feet msl would remain fairly low at around 40 to 45 percent.

The differences between the alternatives would be most apparent during the first 15 years. The greatest difference occurs in year nine, when the difference between baseline conditions and the Shortage Protection Alternative is 19 percent. The Flood Control Alternative, with results that are nearly identical to those of baseline conditions, has the lowest probability of pool elevations dropping below 3677 feet msl, whereas the Shortage Protection and California alternatives have the highest probability. The Basin States and Six States alternatives have probabilities between the baseline conditions and the Shortage Protection Alternative.

Table 3.9-4
Probabilities of Lake Powell Elevation Exceeding 3677 feet in July

Alternative	Range of Probability		
	Years 1-15	Years 16 - 25	Years 26 – 49
Baseline Conditions	79%-39%	40%-34%	46%-40%
Basin States Alternative	78%-36%	39%-34%	46%-40%
Flood Control Alternative	79%-39%	40%-35%	46%-40%
Six States Alternative	78%-36%	39%-34%	46%-40%
California Alternative	75%-33%	40%-34%	46%-40%
Shortage Protection Alternative	75%-33%	39%-34%	46%-40%

The probability of Lake Powell pool elevation exceeding the threshold of 3612 feet msl in July under baseline conditions and each of the alternatives is shown in Figure 3.9-3 and Table 3.9-5. The probability is greater than 70 percent throughout the period of analysis. The probability begins at 100 percent, due to the relatively full initial elevation, and declines gradually throughout the period of analysis. In general, probabilities decrease within a 10 to 15 percent range during the initial 15-year period, followed by an additional 10 to 15 percent decrease from years 16 through 34. For the remainder of the analysis period, decreases are around 5 percent.

The differences between the alternatives is slight, with the greatest difference in probabilities being about eight percent. The Flood Control Alternative has the same

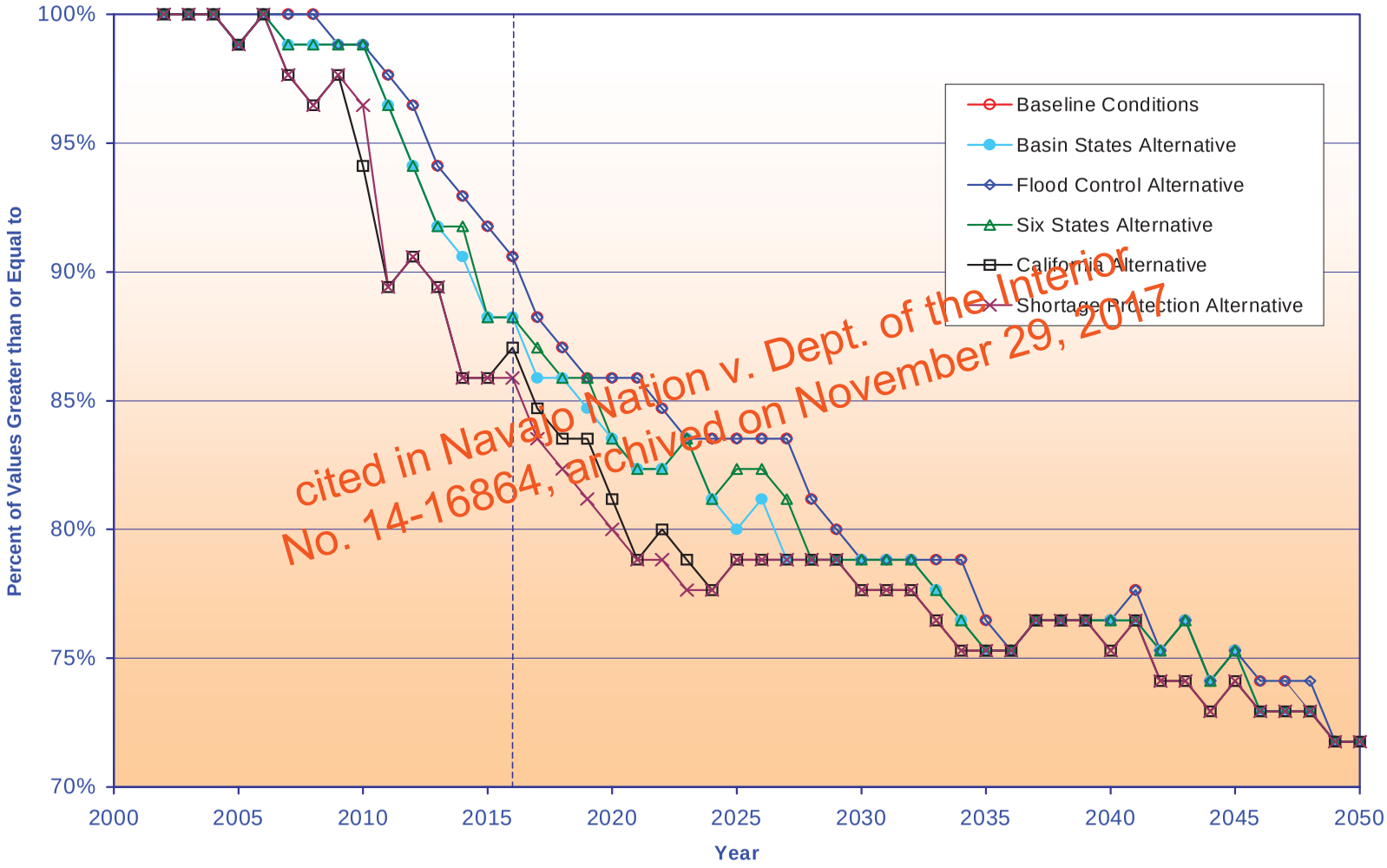
probabilities as baseline conditions and therefore would have no effect. The other alternatives have probabilities less than or equal to baseline conditions. The Shortage Protection and California Alternatives have effects similar to each other and result in the greatest departure (maximum eight percent) from baseline conditions. The Six States and Basin States alternatives are between the Shortage Protection Alternative and baseline conditions, and have a maximum departure of five percent from baseline conditions.

Each of the alternatives is discussed below in more detail with respect to the patterns indicated on Figures 3.9-2 and 3.9-3 and Tables 3.9-4 and 3.9-5.

Table 3.9-5
Probabilities of Lake Powell Elevation Exceeding 3612 feet in July

Alternative	Range of Probability		
	Years 1-15	Years 16-34	Years 35-49
Baseline Conditions	100%-91%	88%-76%	78%-72%
Basin States Alternative	100%-88%	86%-75%	76%-72%
Flood Control Alternative	100%-91%	88%-76%	78%-72%
Six States Alternative	100%-88%	87%-75%	76%-72%
California Alternative	100%-87%	85%-75%	76%-72%
Shortage Protection Alternative	100%-86%	84%-75%	76%-72%

Figure 3.9-3
Lake Powell End of July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percent of Values Greater than or Equal to 3612 Feet msl



3.9.2.3.1.1 Baseline Conditions

The probability under baseline conditions that Lake Powell pool elevation is above 3677 feet msl in July decreases from 79 percent in year 1 to 39 percent in year 15. In years 16 through 25, the probability ranges between 40 and 34 percent. For the remainder of the analysis period the probability ranges between 40 and 46 percent. The early declining probabilities (for baseline conditions and alternatives) can be mostly attributed to increasing consumptive use of Colorado River water in the Upper Basin. The later rise is attributed to the suspension of equalization requirements between Lake Powell and Lake Mead (see Section 1.4.2).

There is a high probability that July Lake Powell pool elevation would exceed the threshold of 3612 feet msl for the baseline condition throughout the period of analysis. Between years 1 and 15, the probability decreases from 100 percent to 91 percent. Between years 16 and 34, the probability continues to decrease gradually from 88 percent to 76 percent. For the remainder of the analysis period, the probability decreases slightly, ranging between 78 and 72 percent. The declining trend of all probabilities (baseline conditions and alternatives) can be mostly attributed to increasing consumptive use of Colorado River water in the Upper Basin.

3.9.2.3.1.2 Basin States Alternative

The probability of the Lake Powell pool elevation exceeding 3677 feet msl in July is slightly lower under the Basin States Alternative than under baseline conditions. In the first 15 years, the probability decreases from 78 percent to 36 percent under the Basin States Alternative. The probability during this period is one percent to eight percent lower than under baseline conditions. In years 16 to 25, the probability decreases to a low of 34 percent, then rises to 39 percent. During this period, the probability is generally the same as for baseline conditions. For the remainder of the analysis period, probabilities fluctuate between 40 and 46 percent, and are generally the same as under baseline conditions.

The probability of Lake Powell elevation exceeding 3612 feet msl in July under the Basin States Alternative is slightly lower than for the baseline conditions. Between years 1 and 15, the probability decreases from 100 percent to 88 percent, compared to a 91 percent probability under baseline conditions. During this period, the probability is typically up to two percent less than under baseline conditions. Between years 16 and 34, the probability continues a gradual decline to 75 percent, and ranges between zero and five percent less, but typically between zero and two percent less, than under baseline conditions. For the remaining years of analysis, the probability continues to decline to a low of 72 percent in year 2050, and is within one percent of the probability under baseline conditions.

3.9.2.3.1.3 Flood Control Alternative

The probability of Lake Powell pool elevation exceeding 3677 feet msl under the Flood Control Alternative is approximately the same as for baseline conditions. In the first 15 years, the probability decreases from 79 to 39 percent, and is within one percent of the probability under baseline conditions. From years 16 to 25, the probability fluctuates between 40 and 35 percent. The probability during this period is typically the same as under baseline conditions. By the end of the period of analysis, the probability remains fairly constant, between 40 and 46 percent. During this period, the probability is typically the same as under baseline conditions.

The probability of Lake Powell pool elevation exceeding 3612 feet msl under the Flood Control Alternative is generally the same as that described for baseline conditions throughout the period of analysis.

3.9.2.3.1.4 Six States Alternative

The probability of Lake Powell pool elevation exceeding 3677 feet msl under the Six States Alternative is very similar to the Basin States Alternative discussed above. In early years, the probability is up to seven percent less than under baseline conditions. In later years, the probability is generally the same as under baseline conditions.

The probability of Lake Powell pool elevation exceeding 3612 feet msl under the Six States Alternative is also very similar to the Basin States Alternative. In early years, the probability is up to four percent less than under baseline conditions. In later years, the probability is typically the same as under baseline conditions.

3.9.2.3.1.5 California Alternative

The probability of Lake Powell pool elevation exceeding 3677 feet msl is lower under the California Alternative than under baseline conditions. In the first 15 years, the probability declines from 75 percent to a low of 33 percent, and ranges from 4 to 16 percent less than under baseline conditions. In years 16 to 25, the probability increases slightly, ranging from 34 to 40 percent, and is typically the same as under baseline conditions. For the remainder of the analysis period, the probability increases slightly, remaining between 40 and 46 percent, and is always within one percent of baseline conditions.

The probability of Lake Powell pool elevation exceeding 3612 feet msl under the California Alternative is slightly lower than under baseline conditions. Between years 1 and 15, the probability decreases from 100 percent to 87 percent and is from zero to eight percent less than under baseline conditions. The probability continues to decrease from 85 to 75 percent in years 16 through 34, and is up to seven percent less than under baseline conditions. For the remaining years of analysis, the probability ranges between 76 and 72 percent, and is from zero to two percent less than under baseline conditions.

3.9.2.3.1.6 Shortage Protection Alternative

The probability of Lake Powell pool elevation exceeding 3677 feet msl under the Shortage Protection Alternative is not significantly different from the California Alternative discussed above. In early years, the probability is up to 19 percent less than under baseline conditions. In later years, the probability is typically the same as under baseline conditions.

The probability of Lake Powell pool elevation exceeding 3612 feet msl under the Shortage Protection Alternative is not significantly different from the California Alternative discussed above. In early years, the probability is up to eight percent less than under baseline conditions. In later years, the probability is within two percent of the probability under baseline conditions.

3.9.2.3.2 Lake Mead

As discussed in the Affected Environment section above, a pool elevation of 1183 feet msl was identified as a representative threshold that is problematic for shoreline access at Lake Mead. Figure 3.9-4 provides an overview of the difference in end-of-year water surface elevations under baseline conditions and each of the action alternatives. Although elevations would typically be lower during the summer peak-use period, the differences between baseline conditions and action alternatives would be similar to those presented herein.

Figure 3.9-5 and Table 3.9-6 indicate the probability of Lake Mead elevation exceeding the threshold of 1183 feet msl at the end of the year. As shown in Figure 3.9-5, the probability is low over the period of analysis due primarily to effects associated with baseline conditions. In the initial 15 years of analysis, the probabilities under baseline conditions and the alternatives decline by more than 20 percent. Shortly after year 15, the probabilities under baseline conditions and the alternatives converge near 35 percent. Subsequently, a probability of 28 to 36 percent is maintained until the end of the analysis period.

Table 3.9-6
Comparison of Lake Mead Elevation Exceedance Probabilities for Elevation 1183 Feet

Alternative	Year 0-15	Years 16 - 49
Baseline Conditions	65%-36%	36%-29%
Basin States Alternative	55%-32%	35%-29%
Flood Control Alternative	65%-36%	38%-29%
Six States Alternative	55%-32%	35%-29%
California Alternative	45%-25%	35%-28%
Shortage Protection Alternative	47%-26%	34%-28%

Figure 3.9-4
Lake Mead End of December Water Elevations
Comparison of Surplus Alternative to Baseline Conditions
90th, 50th and 10th Percentile Values

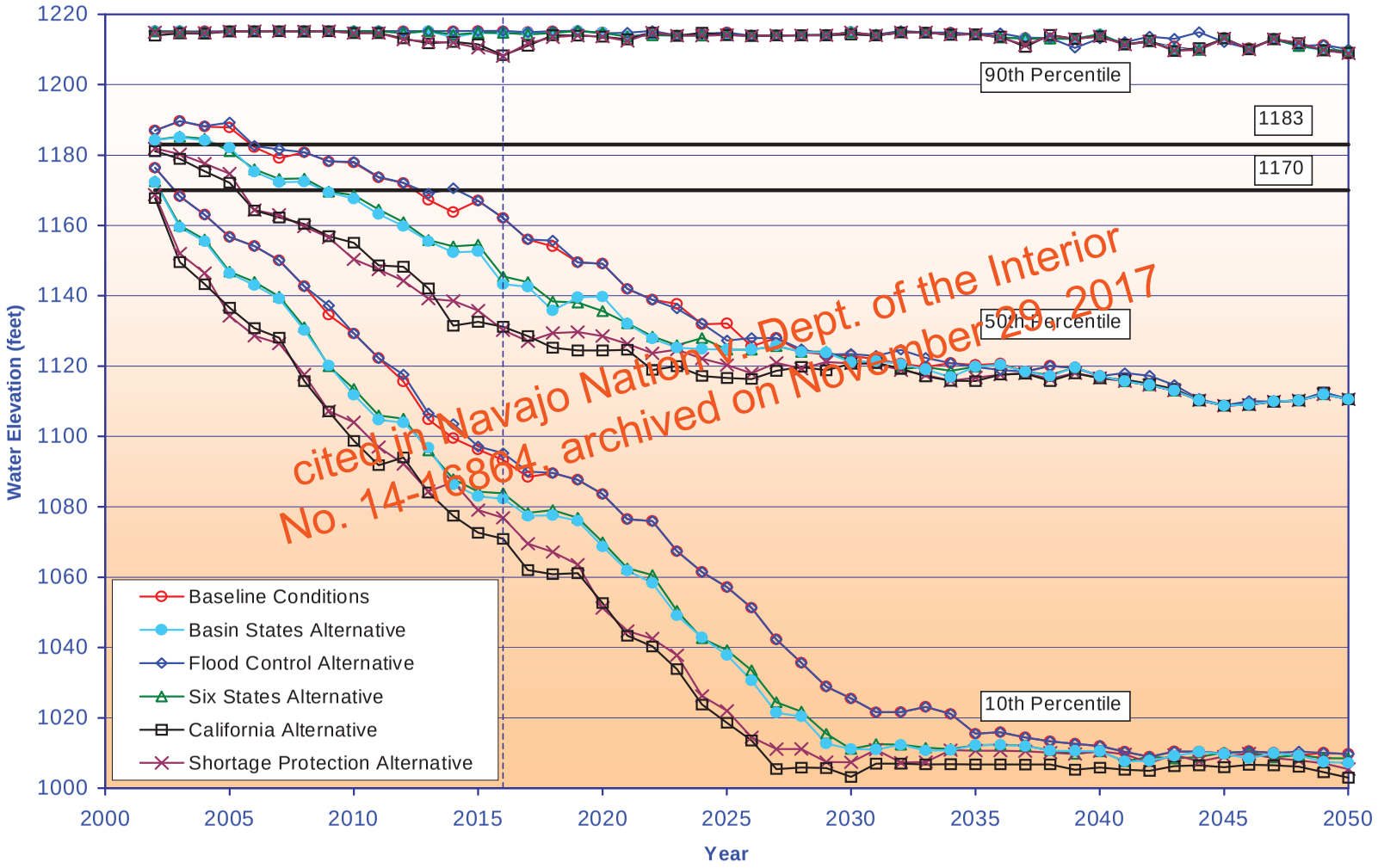
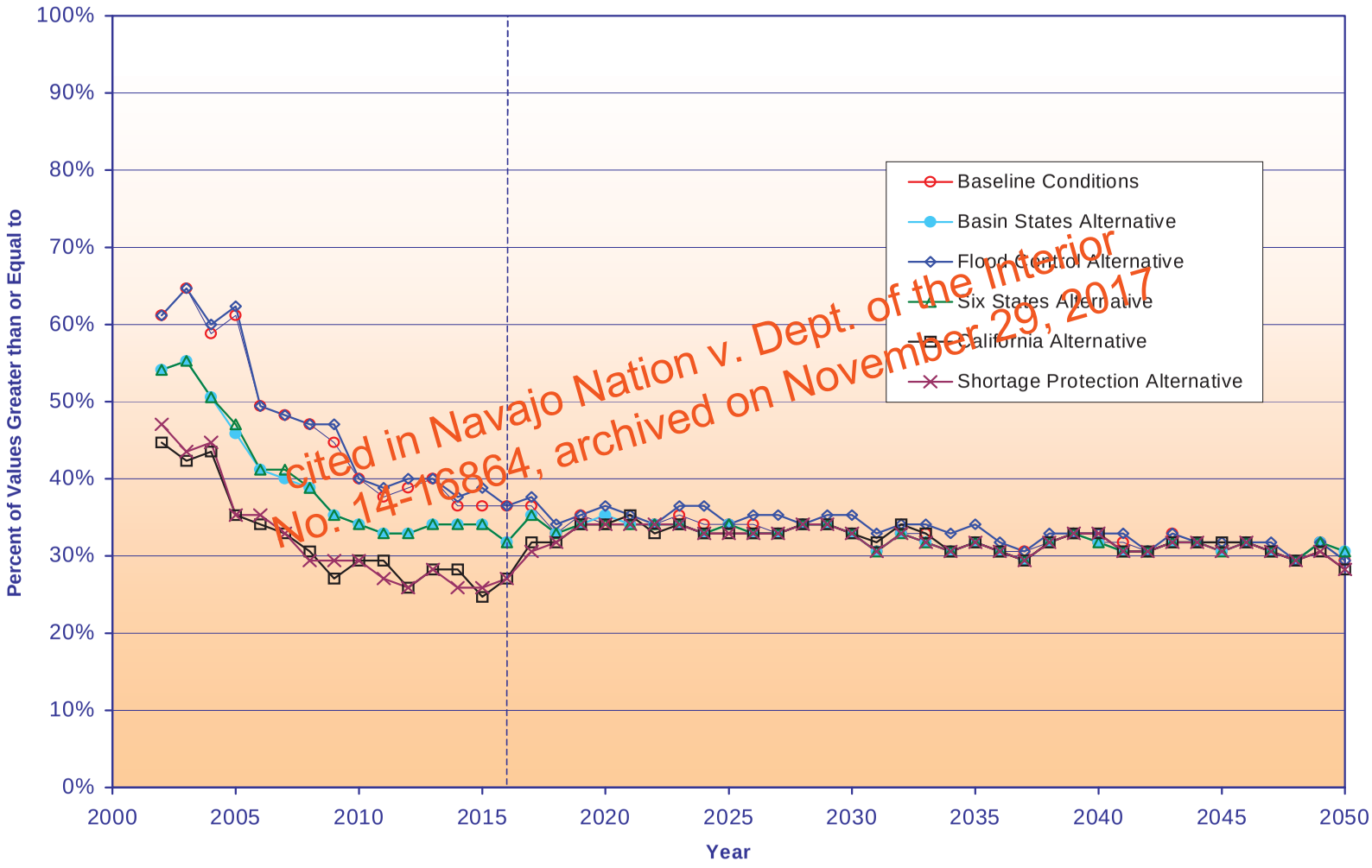


Figure 3.9-5
Lake Mead End of December Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percent of Values Greater than or Equal to 1183 Feet msl



3.9.2.3.2.1 Baseline Conditions

The probability of Lake Mead pool elevation exceeding 1183 feet msl declines from 65 percent to 36 percent under baseline conditions during the first 15 years of the analysis period. In the remaining years of the analysis period, the probability ranges between 36 and 29 percent. The general declining trend of Lake Mead elevations over time can be attributed to increases in Upper Basin use.

3.9.2.3.2.2 Basin States Alternative

The probability of Lake Mead pool elevation exceeding 1183 feet msl in the first 15 years of the analysis period declines from 55 percent to 36 percent under the Basin States Alternative. The probability during this period is typically up to nine percent less than under baseline conditions. In remaining years of the analysis period, the probability ranges between 35 and 29 percent. During this period, the probability is within one percent of the probability under baseline conditions.

3.9.2.3.2.3 Flood Control Alternative

The probability of Lake Mead pool elevation exceeding 1183 feet msl in the first 15 years of the analysis period declines from 65 percent to 36 percent under the Flood Control Alternative. In remaining years of the analysis period, the probability ranges between 38 and 29 percent. The probability of exceeding elevation 1183 feet msl under the Flood Control Alternative would be approximately the same as under baseline conditions throughout the entire analysis period.

3.9.2.3.2.4 Six States Alternative

The probability of Lake Mead pool elevation exceeding 1183 feet msl in the first 15 years of the analysis period declines from 55 percent to 32 percent under the Six States Alternative. In remaining years of the analysis period, the probability ranges between 35 and 29 percent. The probability is nearly identical to that for the Basin States Alternative discussed above.

3.9.2.3.2.5 California Alternative

The probability of Lake Mead pool elevation exceeding 1183 feet msl is lowest under the California Alternative in most years. In the first 15 years, the probability ranges between 45 and 25 percent. This is up to 26 percent lower than under baseline conditions. After year 16, the probability is within one percent of the probability under baseline conditions.

3.9.2.3.2.6 Shortage Protection Alternative

The probability of Lake Mead pool elevation exceeding 1183 feet msl under the Shortage Protection Alternative is nearly the same as under the California Alternative. In the first 15 years, the probability ranges between 47 and 27 percent and is up to 26 percent lower than under baseline conditions. After year 16, the probability associated with the Shortage Protection Alternative generally converges with baseline conditions and the other alternatives, similar to the California Alternative.

3.9.3 RESERVOIR BOATING/NAVIGATION

This section discusses potential effects of the interim surplus criteria on reservoir boating and navigation. This includes a discussion of areas on the reservoir that could become unsafe for boating at certain elevations due to exposed rocks or other obstructions, and safe boating densities that indicate the number of boats that can safely be accommodated on the reservoirs at one time.

Boating navigation and safe boating capacities on Lake Powell and Lake Mead are dependent upon water surface elevations. As lake levels decline, so does the available surface area. Hazards such as exposed rocks may become more evident or changes in navigation patterns may be necessary. The area of the reservoirs available for boating is also reduced, which may affect the number of boats that can safely operate at one time. At low pool elevations, special buoys or markers may be placed to warn boaters of navigational hazards. In addition, signs may be placed in areas that are deemed unsuitable for navigation.

3.9.3.1 METHODOLOGY

Description of the affected environment is based on a literature review of published and unpublished documents and maps, and personal communications with NPS staff at the GCNRA and LMNRA. Information received includes the identification of navigation issues associated with recreational boating on Lake Powell and Lake Mead, such as navigation safety and safe boating densities. Low reservoir pool elevations identified in the literature or through discussions with NPS as being of concern for reservoir boating and navigation are discussed herein. Assessment of environmental consequences associated with implementing the interim surplus criteria alternatives is based on river system modeling and probability analyses of Lake Powell and Lake Mead pool elevations exceeding identified thresholds.

Safe boating capacity is another aspect of boating navigation and safety. Safe boating is one factor that can be used to assess the carrying capacity of a reservoir. To date, no determination of carrying capacity (number of boats at one time) has been made for either Lake Powell or Lake Mead. However, the NPS is currently developing a carrying capacity approach for managing water-based recreation on Lake Mead that is based on

the U.S. Forest Service Recreation Opportunity Spectrum system. Results of the NPS study were not available for this analysis.

A safe boating density of nine acres per boat was established for the GCNRA (USBR, 1995b) at Lake Powell. The safe boating density could be used to assess the effects of the interim surplus criteria alternatives on boating safety if daily boating levels for the reservoir were available. However, there is no known information on the level of daily or peak boating use, such as whether the current boating densities on the reservoirs have approached or exceeded the safe boating density (as discussed below). Without information on current reservoir boat densities, it is not known whether future reductions in pool elevations at Lake Powell and Lake Mead would result in unsafe boating conditions.

3.9.3.2 AFFECTED ENVIRONMENT

3.9.3.2.1 Lake Powell Boating Navigation and Safety

In 1986, the GCNRA developed an "Aids to Navigation Plan" for Lake Powell that identified boating safety issues on the reservoir and low pool elevations that could affect boating (NPS, 1986). The navigation system uses regulatory buoys and other marking devices to warn boat operators of hazardous conditions associated with subsurface obstructions or changes in subsurface conditions that could be hazardous for safe passage. Placement of many of these marking devices is dependent on the lake elevation.

At pool elevations below 3680 feet msl, there are several places that remain passable, although buoys are placed for safe navigation. At elevation 3626 feet msl and 3620 feet msl, there are two areas on the reservoir that are closed to commercial tour boats and recreational boats, respectively, because of hazardous obstructions to navigation. One of the areas is around Castle Rock, just east of the Wahweap Marina, and the other is around Gregory Butte, which is about midway to Dangling Marina from Wahweap (as shown on Map 3.9-1). At elevation 3626 feet msl commercial tour boats leaving the Wahweap Marina heading up reservoir (east) must detour 8.5 miles around the southern end of Antelope Island. At Gregory Butte, commercial tour boats must detour 4.5 miles around Padre and Gregory Buttes (NPS, 1986). The added mileage and increased travel time makes the more popular half-day trips of the area infeasible for commercial tour boat operators. In addition, the added mileage may influence recreational boaters to remain in the area of Wahweap Bay, which can result in congestion (Henderson, 2000).

In addition to buoys marking obstructions, the Aids to Navigation Plan also established a marked travel corridor to guide boat travel on Lake Powell. This primary travel corridor is the main channel of the old Colorado River bed and is marked with buoys along the entire length of the reservoir. Except for the reservoir mouth, there are no known pool elevations at which boat passage along this main travel corridor becomes restricted and affects boating.

Near the upstream end of the reservoir, where the San Juan River enters, a delta has formed that can affect river boaters coming into Lake Powell at low pool elevations. River boaters from the San Juan River paddle through Lake Powell to a location where a boat transports them 20 to 25 miles (depending on the pick-up location) to the Hite Marina. At low water surface elevations, the river boaters must travel further downstream to reach a location that is accessible to the transport company's boat.

Although this results in more miles to paddle to the takeout, there is usually enough current in the river to carry the boats. For some boaters, the added mileage is an opportunity to paddle additional rapids on the Colorado River in Cataract Canyon (Hyde, 2000). For others, the additional mileage is seen as exposure to additional navigational hazards, possibly requiring portaging of boats due to restricted channel widths and subsurface conditions.

3.9.3.2.1.1 Lake Powell Safe Boating Capacity

Recreational boating is the most frequent type of boating activity on Lake Powell, with an estimated 1.5 million boaters per year. One of the most popular activities at Lake Powell is to take houseboats and motor boats for multiple day excursions to explore the reservoir.

The number of boats that Lake Powell can safely accommodate at one time (i.e., safe boating capacity) is based on a 1977 Bureau of Outdoor Recreation standard of nine surface acres per boat (USBR, 1995b). The amount of water storage in Lake Powell directly influences the surface area of the reservoir and the number of boats that can safely be on the reservoir. Table 3.9-7 lists median July Lake Powell surface areas for baseline conditions and alternatives in the year 2016 and identifies the safe boating capacity of the reservoir at those elevations, based on an assumed maximum safe density of nine acres per boat. The surface area of Lake Powell is reduced by approximately 9 to 10 percent for each 20-foot drop.

Table 3.9-7
Lake Powell Safe Boating Capacity at Water Surface Elevations

Scenario	Median Elevation in July of Year 15 (feet msl)	Water Surface Area (acres)	Safe Boating Capacity[1]
Baseline Conditions	3665	134,600	14,956
Basin States Alternative	3664	134,100	14,900
Flood Control Alternative	3665	134,600	14,956
Six State Alternatives	3664	134.100	14,900
California Alternative	3660	130,800	14,533
Shortage Protection Alternative	3659	130,200	14,467

[1] Number of boats, assuming safe density of 9 acres per boat.

At full pool for Lake Powell (3700 feet msl), the surface area is 160,782 acres. Using the safe boating density of nine surface acres per boat, Lake Powell's safe boating capacity at full storage is approximately 17,865 boats. As pool elevation decreases, the surface area available for boats also decreases. While safe reservoir boating carrying capacity is reduced at lower lake elevations, there may be additional shoreline camping available due to more exposed beaches. However, boating capacity is more constrained by safe boating densities than by the availability of camping sites on Lake Powell (Combrink and Collins, 1992).

3.9.3.2.2 Lake Mead Boating Navigation and Safety

Similar to the navigation system on Lake Powell, regulatory buoys and other marking devices are used on Lake Mead to warn boat operators of dangers, obstructions, and changes in subsurface conditions in the main channel or side channels.

As with Lake Powell, the main channel of the old Colorado River bed forms the primary travel corridor on Lake Mead and is marked along its entire length with buoys for boating guidance. In addition, regulatory buoys are placed in areas where there may be a danger for safe passage.

Excursions from Lake Mead into the Grand Canyon are a popular activity. Boats entering the Grand Canyon usually launch at Pearce Ferry, South Cove or Temple Bar (refer to Map 3.9-2). There are no developed facilities at South Cove or Pearce Ferry. Points of interest in the Grand Canyon include Columbine Falls, Bat Cave, Spencer Creek, and Separation Canyon. In addition to sightseeing being a popular activity, many boaters include overnight camping stays on these excursions (USBR, 1995b).

The upper arms and inflow areas of Lake Mead are considered dangerous for navigation due to shifting subsurface sediments. In the main channel of the reservoir, the Grand

Wash Cliffs area is the beginning of dangerous navigation conditions, and no houseboats are allowed beyond this point (NPS, undated).

Over the years, sediment has built up in the section of the reservoir between Grand Wash and Pearce Ferry. When lake elevations drop below 1170 feet msl, the sediment is exposed as mud flats and there is no well-defined river channel. As a result, the area is too shallow for motor boats to navigate upstream and into the lower reaches of the Grand Canyon. With fluctuating flows, even smaller crafts have a difficult time accessing the area because of the shifting nature of the channel (USBR, 1995b). Based on this information, 1170 feet msl is considered a threshold elevation for safe boating navigation at Lake Mead.

While the area around Pearce Ferry is an issue for navigation at 1170 feet msl, it is also inaccessible as a take out for whitewater boaters at elevation 1183 feet msl and boaters must paddle an additional 16 miles to South Cove (Henderson, 2000). Paddling to South Cove includes paddling through the section of reservoir between Pearce Ferry and Grand Wash. (Refer to Section 3.9.2.2.3 for a description of the Pearce Ferry facility, and Section 3.9.2.3.2 for an analysis of environmental consequences associated with elevation 1183 feet msl.)

In addition to the boating navigation issues summarized above, there are swimmer safety issues at Lake Mead. At Gypsum Wash (between Las Vegas Bay and Government Wash), there are cliffs that are popular with recreationists for jumping into the lake. When lake elevations are below 1180 feet msl, the water is too shallow for cliff jumping from this location. Another jumping spot that was poplar during the late 1980's when reservoir levels were down is an area called "33 Hole." This location is popular for cliff jumping when the lake elevation reaches 1165 feet msl. Cliff jumping at both locations is discouraged by the NPS for safety reasons (Burke, 2000). Since the activity is discouraged, the identified elevations were not considered as thresholds for evaluation of effects.

3.9.3.2.3 Lake Mead Safe Boating Capacity

The LMNRA receives approximately ten million visitors annually. Of those that participate in water-based recreation, most either swim, boat, fish, sailboard, use paddlecraft, or scuba dive (USBR, 1996b). Since no boating capacity has been established for Lake Mead, the safe boating density of nine acres per boat established for Lake Powell was assumed; safe boating capacities were determined based on reservoir elevation/surface area relationships. There is no daily or peak boating use information available to establish the relationship between actual boating densities and the safe boating capacity values shown below in Table 3.9-8. This table shows Lake Mead surface area under the predicted pool elevations for baseline conditions and the alternatives at the end of 2016, and identifies the safe boating capacity of the reservoir based on an assumed maximum safe density of nine acres per boat.

Table 3.9-8
Lake Mead Safe Boating Capacity at Water Surface Elevations

Scenario	Median Elevation at End of Year 15 (feet msl)	Water Surface Area (acres)	Safe Boating Capacity[1]
Baseline Conditions	1162	120,200	13,356
Basin States Alternative	1143	108,100	12,011
Flood Control Alternative	1162	120,200	13,356
Six State Alternatives	1145	109,400	12,156
California Alternative	1131	102,100	11,344
Shortage Protection Alternative	1130	101,700	11,300

[1] Number of boats, assuming safe density of 9 acres per boat.

At full pool for Lake Mead, the operating surface area is 153,235 acres. Using the safe boating density of nine surface acres per boat, Lake Mead's safe boating capacity at full storage is approximately 17,000 boats. As pool elevation decreases, the safe boating capacity also decreases.

3.9.3.3 ENVIRONMENTAL CONSEQUENCES

Boating navigation and safe boating densities on Lake Powell and Lake Mead are dependent upon water surface elevations. As lake levels fluctuate, hazards, such as exposed rocks at lower pool elevations or different navigational patterns at higher elevations, may become evident. At low pool elevations, special buoys or markers may be placed to warn boaters of navigational hazards. In addition, signs may be placed in areas deemed unsuitable for navigation.

Assessment of environmental consequences of the alternatives on boating navigation and safety is based on river system model output, described in detail in Section 3.3. The probability of effects under baseline conditions and the alternatives was determined through identifying the probability of exceeding a representative "threshold" pool elevation during the period of analysis. The selection of the threshold pool elevation is based on the known boating navigation issues discussed in the Affected Environment section above. The probabilities of the reservoirs remaining above the identified threshold elevations are identified for baseline conditions and the interim surplus criteria alternatives, and differences between probabilities under baseline conditions and alternatives are compared.

In addition to navigation issues that occur at low pool elevations, the number of boats that can safely be accommodated on the reservoir at one time (safe boating capacity) is also a reservoir boating issue. As discussed previously, the lack of boating use data and spatial modeling of the effects of the alternatives on shoreline conditions precludes a quantitative or qualitative assessment of the impacts associated with the alternatives. In general, as pool elevations change, so does the reservoir surface area and the number of boats that can safely be accommodated on the reservoir. Therefore, the alternatives that

result in the greatest potential for lower surface elevations would tend to increase the likelihood of exceeding safe boating densities. Without current and projected boating use levels for comparison to surface areas under the alternatives, it cannot be determined whether the change in available surface area would result in an exceedance of the calculated safe boating capacities shown in Tables 3.9-7 and 3.9-8, so environmental consequences related to safe boating capacity are not analyzed further.

3.9.3.3.1 Lake Powell

For Lake Powell boating navigation, a reservoir pool elevation of 3626 feet msl was identified as a representative threshold in Section 3.9.3.2.1. Figure 3.9-1 (presented previously) shows elevation trends for baseline conditions and the alternatives over the period of analysis.

In addition, as discussed in the section on shoreline facilities (Section 3.9.2.2.2), elevation 3626 feet msl is also close to the elevation for a new proposed boat ramp at Antelope Point, which will extend down to 3620. Using an assumption of six feet for freeboard, the environmental consequences associated with elevation 3626 for navigation are applicable to the future operability of the proposed ramp at Antelope Point.

Figure 3.9-6 depicts the probability of pool elevations exceeding 3626 feet msl under baseline conditions and each of the alternatives. Table 3.9-9 presents a comparison of the probabilities associated with years 1 through 15, 16 through 28, and 29 through 49. The probability decreases (from 100 to 65 percent) during the analysis period under baseline conditions and all of the alternatives. The probability is greatest for baseline conditions and the Flood Control Alternative, and least for the California and Shortage Protection Alternatives. The Six States and Basin States alternatives have probabilities between the others.

Figure 3.9-6
Lake Powell End of July Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to 3626 Feet

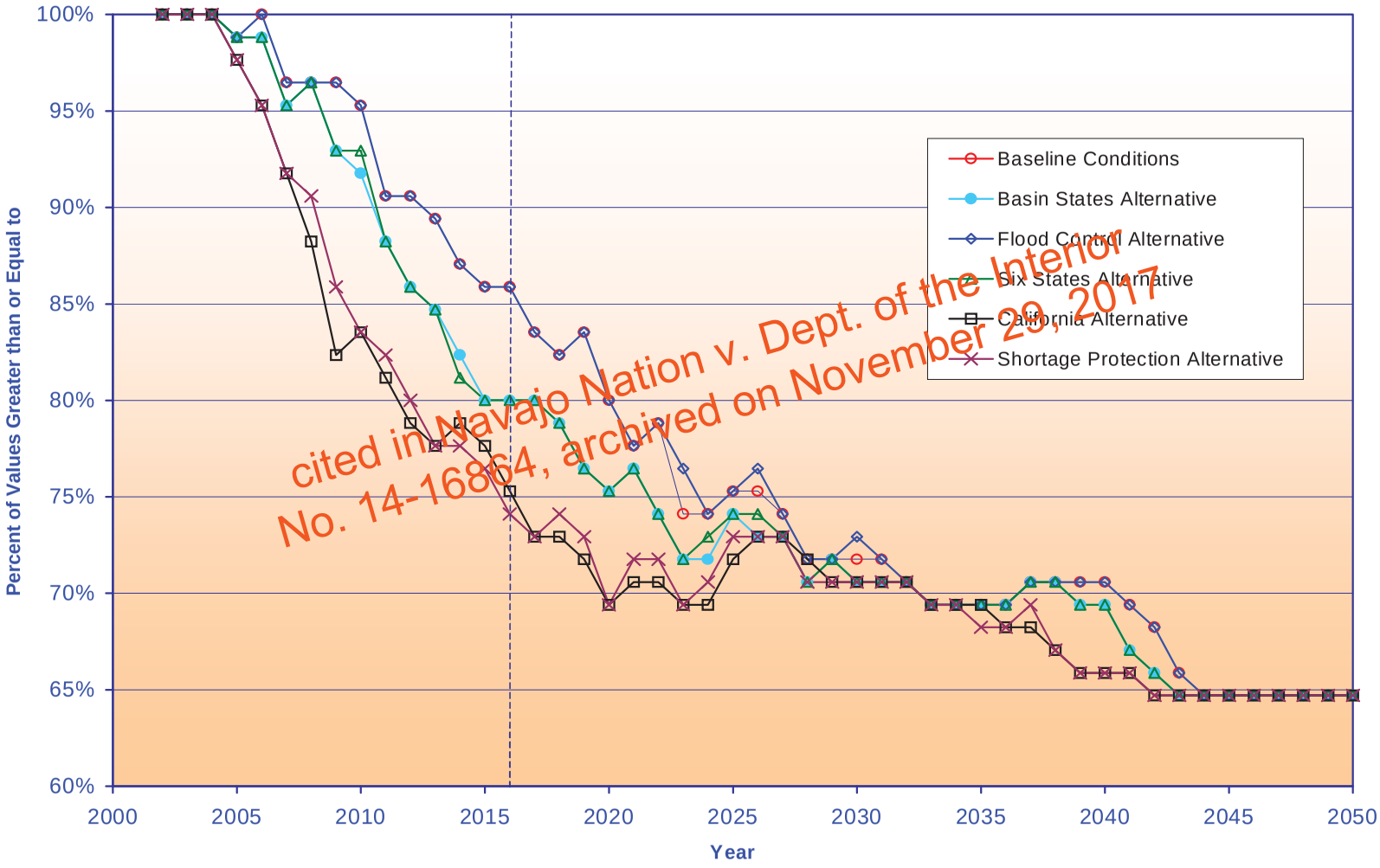


Table 3.9-9
Probabilities of Lake Powell Elevation Exceeding 3626 feet in July

Projected Condition	Range of Probability		
	Years 1 - 15	Years 16 - 28	Years 29 - 49
Baseline Conditions	100%-86%	84%-72%	72%-65%
Basin States Alternative	100%-80%	80%-71%	71%-65%
Flood Control Alternative	100%-86%	84%-72%	73%-65%
Six States Alternative	100%-80%	80%-71%	71%-65%
California Alternative	100%-75%	73%-69%	71%-65%
Shortage Protection Alternative	100%-74%	74%-69%	71%-65%

3.9.3.3.1.1 Baseline Conditions

The probability of Lake Powell pool exceeding the safe boating navigation elevation of 3626 feet msl in July gradually decreases from 100 percent to 65 percent under baseline conditions during the entire period of analysis. The probability decreases more slowly under baseline conditions and the Flood Control Alternative than under the other alternatives. In the first 15 years of the analysis period, the probability decreases from 100 to 86 percent. From years 16 to 28, the probability decreases from 84 to 72 percent. For the remainder of the analysis period, the probability continues to decrease, declining from 72 to 65 percent.

3.9.3.3.1.2 Basin States Alternative

The probability of Lake Powell pool elevation exceeding 3626 feet msl gradually decreases from 100 percent to 65 percent under the Basin States Alternative during the entire period of analysis. During the first 15 years, the probability declines more rapidly than under baseline conditions, dropping from 100 to 80 percent. The probability in year 15 is six percent less than under baseline conditions. Between years 16 and 28, the probability begins to converge with the probabilities of baseline and the other alternatives, and ranges between 80 and 71 percent. During this period, the probability is up to 7 percent less than under baseline conditions. For the remainder of the analysis period, the probability is similar to baseline conditions and the other alternatives, continuing to decline to a low of 65 percent.

3.9.3.3.1.3 Flood Control Alternative

For the Flood Control Alternative, the probability of Lake Powell pool elevation exceeding 3626 feet msl is practically the same as for baseline conditions throughout the analysis period. As shown in Figure 3.9-6, there are only three years in which the probability is different (within one to two percent) from baseline conditions.

3.9.3.3.1.4 Six States Alternative

The probability of Lake Powell elevation exceeding 3626 feet msl under the Six States Alternative is identical to the probability under the Basin States Alternative in all but four years, when there is a one percent difference.

3.9.3.3.1.5 California Alternative

The California Alternative results in the lowest probability of Lake Powell pool elevation exceeding 3626 feet msl. The probability decreases from 100 to 75 percent in the first 15 years of the analysis period. Between years 16 and 28, the probability begins to converge with the probabilities under baseline and the other alternatives, ranging between 73 and 69 percent. For the remainder of the analysis period, the probability is similar to baseline conditions and the other alternatives, continuing to decline to a low of 65 percent. During these three periods, the probability is up to 14 percent, 12 percent and 5 percent, respectively, below the probability under baseline conditions.

3.9.3.3.1.6 Shortage Protection Alternative

For the Shortage Protection Alternative, the probability of Lake Powell pool elevation exceeding 3626 feet msl is nearly the same as under the California Alternative throughout the analysis period. The probability is up to 12 percent less than under baseline conditions during the first 15 years of the analysis period. Between years 16 and 28, the probability begins to converge with the probabilities under baseline conditions and the other alternatives, and is up to 11 percent less than under baseline conditions. For the remainder of the analysis period, the probability is within 5 percent of baseline conditions.

3.9.3.3.2 Lake Mead

A reservoir pool elevation of 1170 feet msl was identified as the representative threshold for boating navigation at Lake Mead, as described in Section 3.9.3.2.2.

Figure 3.9-7 depicts the probability of Lake Mead end-of-December pool elevations exceeding 1170 feet msl for baseline conditions and the alternatives. Table 3.9-10 compares the probabilities associated with years 1 through 15, years 16-22, and years 23 through 49.

Figure 3.9-7
Lake Mead End of December Water Elevations
Comparison of Surplus Alternatives to Baseline Conditions
Percentage of Values Greater than or Equal to 1170 Feet

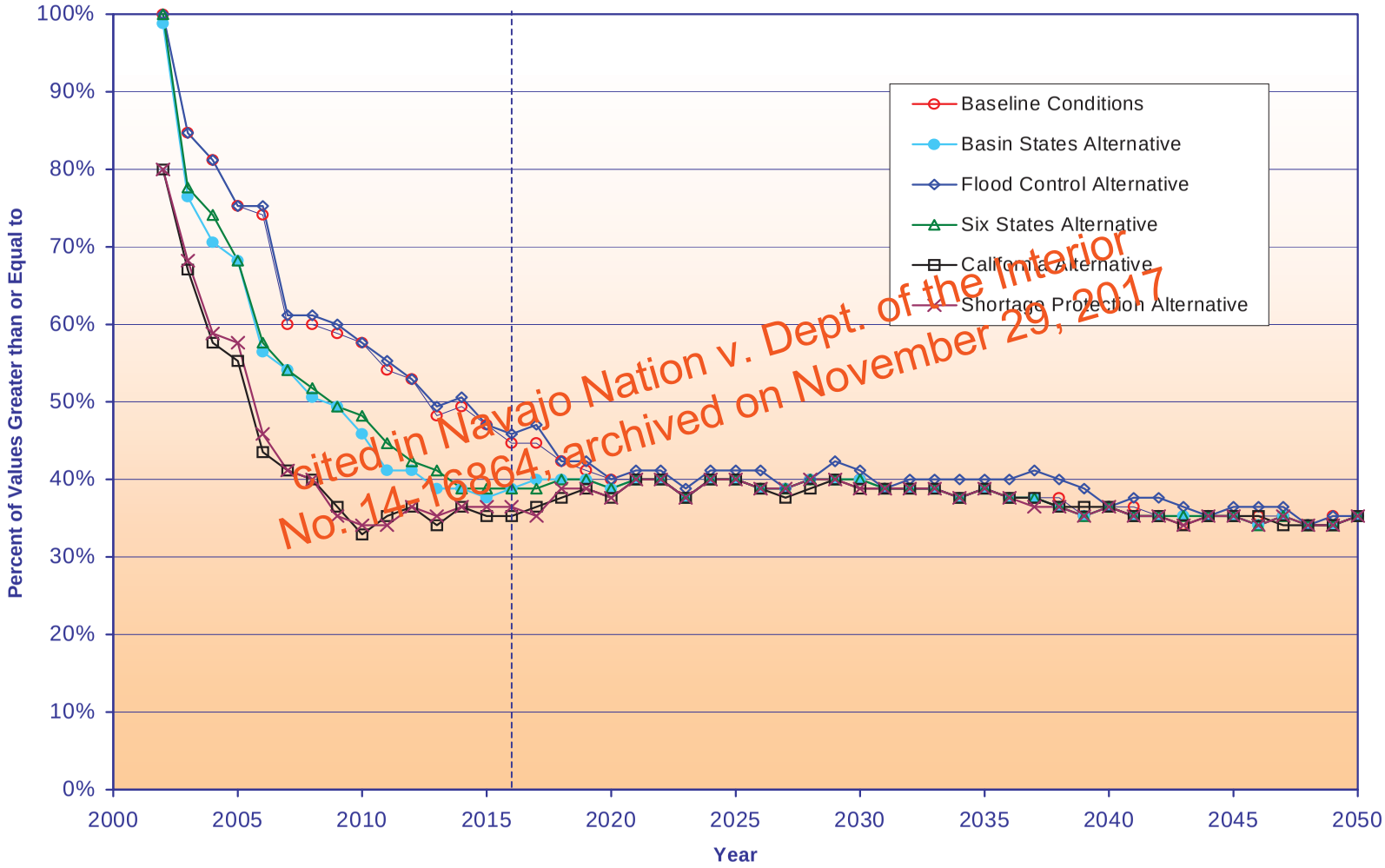


Table 3.9-10
Probabilities of Lake Mead End-of-December Elevation Exceeding 1170 feet

Projected Condition	Range of Probability		
	Years 1 – 15	Years 16 - 22	Years 23 - 49
Baseline Conditions	100%-45%	45%-38%	40%-34%
Basin States Alternative	99%-38%	40%-38%	40%-34%
Flood Control Alternative	100%-46%	47%-39%	42%-34%
Six States Alternative	100%-39%	40%-38%	40%-34%
California Alternative	80%-33%	40%-36%	40%-34%
Shortage Protection Alternative	80%-34%	40%-35%	40%-34%

Under baseline conditions and the alternatives, the probability of Lake Mead pool elevation exceeding 1170 feet msl declines during the interim period, then stabilizes for the remainder of the period of analysis. The probability is greatest for baseline conditions and the Flood Control Alternative, and least for the California and Shortage Protection Alternatives. The Basin States and Six States alternatives have probabilities between the others.

3.9.3.3.2.1 Baseline Conditions

The probability of Lake Mead pool elevation exceeding the safe boating and navigation elevation of 1170 feet msl at the end of the year declines from 100 to 34 percent under baseline conditions throughout the entire period of analysis. Probabilities decrease more slowly under baseline conditions than under all alternatives except for Flood Control. In the first 15 years of analysis, the probability declines from 100 to 45 percent. Between years 16 and 22, the probability continues to decline from 45 to 38 percent, as the alternatives converge with baseline conditions. For the remainder of the analysis period, the probability under baseline conditions is similar to the alternatives, ranging between 40 and 34 percent.

3.9.3.3.2.2 Basin States Alternative

The probability of Lake Mead pool elevation exceeding 1170 feet msl declines from 99 to 34 percent throughout the entire period of analysis for the Basin States Alternative. As with most other alternatives, the decrease occurs during the interim period and occurs more quickly than under baseline conditions. In the first 15 years of the analysis period, the probability drops from 99 percent to 39 percent and is typically up to 13 percent less than under baseline conditions. Between years 16 and 22, the probability stabilizes and converges with baseline conditions. The range of probability is from 40 to 38 percent, and is up to five percent less than under baseline conditions. For the

remainder of the analysis period, the probability is within one percent of baseline conditions, ranging between 40 and 34 percent.

3.9.3.3.2.3 Flood Control Alternative

The probability of Lake Mead pool elevation exceeding 1170 feet msl under the Flood Control Alternative is typically up to two percent greater than under baseline conditions. In the first 15 years of analysis, the probability decreases from 100 to 46 percent, and is within one percent of baseline conditions. Between years 16 and 22, the probability continues to decline, ranging between 47 and 39 percent, and is typically one percent greater than under baseline conditions. For the remainder of the analysis period, the probability is up to 4 percent greater than baseline conditions, ranging between 42 and 34 percent.

3.9.3.3.2.4 Six States Alternative

The effects of the Six States Alternative would be nearly the same as those for the Basin States Alternative. In the first 15 years of the analysis period, the probability of Lake Mead elevation exceeding 1170 feet msl is typically up to 11 percent less than under baseline conditions. Between years 16 and 22, the probability stabilizes and converges with baseline conditions. The probability is typically within two percent of baseline conditions. For the remainder of the analysis period, the probability is within one percent of baseline conditions, ranging between 40 and 34 percent.

3.9.3.3.2.5 California Alternative

The probability of Lake Mead pool elevation exceeding 1170 feet msl under the California Alternative is similar to that under the Shortage Protection Alternative and less than under baseline conditions and the other alternatives. In the first 15 years, the probability drops from 80 to 33 percent, then rises to 35 percent. The probability is up to 31 percent less than under baseline conditions. Between years 16 and 22, the probability rises slightly and converges with baseline conditions and the other alternatives. The probability ranges from eight percent less than to the same as under baseline conditions. For the remainder of the analysis period, the probability is within one percent of baseline conditions.

3.9.3.3.2.6 Shortage Protection Alternative

The effects of the Shortage Protection Alternative are very similar to those described for the California Alternative. The probability of Lake Mead pool elevation exceeding 1170 feet msl is generally within one percent of the probability under the California Alternative throughout the period of analysis.

3.9.4 RIVER AND WHITEWATER BOATING

The Grand Canyon Protection Act directs the Secretary to operate Glen Canyon Dam in accordance with the additional criteria and operating plans specified in Section 1804 of the Act, and to exercise other authorities under existing law in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to natural and cultural resources and visitor use.

The Glen Canyon Dam Adaptive Management Program (AMP) was established as a Federal Advisory Committee to assist the Secretary in implementing the Grand Canyon Protection Act. As discussed in Section 3.2.2, the AMP provides a process for assessing the effects of current operations of Glen Canyon Dam on downstream resources and using the results to develop recommendations for modifying operating criteria and other resource management actions. While the interim surplus criteria could have an influence on releases from Glen Canyon Dam, such releases will be governed by the criteria in the Record of Decision, which was developed in full consideration of both the safety and quality of recreational experiences in Glen and Grand Canyons. A summary of the Glen Canyon Dam Record of Decision has been included as Attachment D of this FEIS.

The only effect that implementation of the interim surplus criteria alternatives would have on whitewater boaters would be the possibility of lowered pool elevations in Lake Powell and Lake Mead. Whitewater boaters on the San Juan River often end their trips at Lake Powell. While decreased levels in Lake Powell have effects on take out points in the Colorado and San Juan Rivers, they also may expose additional rapids in Cataract Canyon, which would expand whitewater rafting opportunities. Section 3.9.3.2.1 discusses boaters entering Lake Powell.

Whitewater boaters on the Colorado River often end their trips in Lake Mead. Pearce Ferry is the preferred Lake Mead take out for boaters, but it may not be accessible when the reservoir pool elevation is below 1183 feet msl. An analysis of this elevation is presented in Section 3.9.2.2. A take out is also available at Diamond Creek, upstream of Lake Mead at the Hualapai Reservation. The Hualapai Tribe maintains the take out area and road and charges a fee for take out. The Hualapai Tribe also conducts river trips from Diamond Creek (on the Colorado River) to Pearce Ferry. This concession may be affected if trips encounter changes in availability of the Pearce Ferry take out.

3.9.5 SPORT FISHING

This section considers potential effects of the interim surplus criteria alternatives on recreational opportunities associated with sport fishing at Lake Powell, Lake Mead and Lake Mohave (between Hoover and Davis Dam). Sport fishing in the Colorado River between Glen Canyon Dam and Lake Mead will not be affected by the interim surplus criteria action due to the protection afforded by the Adaptive Management Program (see

Section 3.9.4). Fluctuations in flows between Hoover Dam and the SIB under the alternatives would be within the historical operating range of the river. Therefore, changes in flows under the alternatives would not affect recreation within these areas. Adverse effects on sport fisheries from potential changes in water temperature below Hoover Dam would not be expected, as discussed in Section 3.7.3.

3.9.5.1 METHODOLOGY

The discussion of the affected environment for reservoir fishing is based on a review of published documents. Much of this information was derived from the following sources: for Lake Powell, the *Fish Management Plan, Glen Canyon National Recreation Area* (NPS, 1996); and for Lake Mead, the *Desert Lake View Newspaper, Fall/Winter 1999*. In addition, creel information and angler fishing data has been obtained from state agencies in Utah, Arizona, and Nevada responsible for managing the fisheries resources at Lake Mead, Lake Powell, and Lake Mohave.

Assessment of potential impacts on sport fishing in Lake Powell, Lake Mead and Lake Mohave is based on information presented in other sections of the document regarding sport fishery populations (Section 3.7), reservoir shoreline facilities (Section 3.9.2) and reservoir navigation (Section 3.9.3). There were no specific reservoir pool elevation thresholds related to sport fishing identified from the literature reviewed. Catch rates for reservoir fishing are assumed to be directly related to reservoir habitat discussed in Section 3.7, Aquatic Resources. Fishing satisfaction is assumed to be directly related to the general recreation issues of boating access to the water via shoreline facilities, and boating navigation potential for hazards or reservoir detours due to low pool elevations. As discussed in Section 3.7, catch rates are not expected to be affected by fluctuations in pool elevations.

3.9.5.2 AFFECTED ENVIRONMENT

3.9.5.2.1 Sport Fishing in Lake Powell

As discussed in Sections 3.7 and 3.8, native Colorado River species have not done well in the reservoir environment. While some native species may spawn in the reservoir, it is believed that the majority of young are eliminated by sport fish predators. The predominant sport fishery in Lake Powell revolves around striped bass. The striped bass depend on threadfin shad as a food source, so it is critical to maintain a balanced shad population for the striped bass. The threadfin shad in Lake Powell are at the northernmost portion of their range and are very sensitive to fluctuations in water temperature. In addition to striped bass, Lake Powell supports largemouth and smallmouth bass, walleye, channel catfish, bluegill, and black crappie. Lake Powell has been stocked with fish almost annually, beginning in 1963 (NPS, 1996).

Lake Powell is a popular fishing destination. Over three million people visit the GCNRA annually, and those that fish spend a total of close to two million angler hours in pursuit of a variety of sport fish.

Nearly all anglers fish by boat due to the cliff-like canyon walls of the reservoir. Shore angling is rare. Annual angler use, based on boat fishing, is estimated to average 72,608 days. The majority of anglers (42 percent) come from Utah, followed by Colorado (24 percent) and Arizona (23 percent). California and other states make up the remaining 11 percent (Gustaveson, 2000).

Currently, the catch rate is 0.3 fish per hour, a number that has declined in recent years due to angling pressure. Approximately one-half of the fish caught are harvested, which results in an average annual harvest of 300,000 fish (NPS, 1996). Fishing catch rates and harvest rates differ at Lake Powell due to changing public attitudes towards catch and release. Most anglers release smallmouth bass and harvest striped bass. In 1997, 86 percent of the smallmouth bass caught were returned, compared to only 28 percent of the 396,000 striped bass caught (Gustaveson, 2000).

Most Lake Powell anglers seek a fishing opportunity and would rather catch any fish, compared to a targeted individual species. However, when asked for a species preference, most anglers prefer to catch black bass or striped bass. Most anglers tend to target species they expect to catch most readily. (Gustaveson, 2000).

Recent studies have indicated a trend of increasing biocontaminant concentration in aquatic organisms near the dam. Selenium has been found in plankton and in striped bass. Although there have not yet been any apparent negative impacts on striped bass reproduction, selenium can pose a health risk to anglers from consumption. If the presence of selenium continues, educating the anglers and performing risk assessment studies may be necessary (NPS, 1996).

3.9.5.2.2 Sport Fishing in Lake Mead

Fishing is a favorite activity at Lake Mead. Largemouth bass, striped bass, channel catfish, rainbow trout, bullhead catfish, sunfish, crappie, and bluegill can be found in Lake Mead.

Lake Mead is famous for its striped bass, with an occasional catch weighing over 40 pounds, although weights of three to five pounds are more common. Angler survey results from NDOW indicate that since 1984, striped bass have been the species most sought after by anglers by a wide margin (62.7 percent) (NDOW, 2000). Fishing for striped bass or largemouth bass is good throughout the entire lake, but panfish and catfish are more prevalent in the upper Overton Arm.

The Nevada Division of Wildlife (NDOW) stocks rainbow trout from late December through the spring months. The razorback sucker, a protected fish species, must be

returned to the water immediately and carefully, if caught. Fishing is generally better in the fall months of September, October and November. Larger fish are caught by deep water trolling in spring from March through May.

To fish from shore, a valid license is required from the state where the fishing occurs. If fishing from a boat or other flotation device, a use stamp from the other state is required. Rainbow trout fishing also requires an additional stamp. Children under 14 are not required to have a license.

The NDOW conducts annual creel and angler use surveys of Nevada licensed anglers (resident and non-resident). While Arizona licensed anglers also fish in Lake Mead, it is estimated that roughly 80 percent of the fishing use on the reservoir is represented in the NDOW surveys (Sjöberg, 2000). NDOW's annual statewide angler questionnaire is mailed out to 10 percent of all Nevada licensed anglers, resident and non-resident. Table 3.9-11 presents data from 10 years of questionnaires.

Table 3.9-11
Nevada Division of Wildlife Annual Angler Questionnaire Results for Lake Mead

Year	Anglers	Angler Days	Fish Harvest (all species)	Days per Angler	Fish per Angler	Fish per Angler Day
1989	44,444	476,543	940,608	10.72	21.16	1.97
1990	41,012	488,381	934,807	11.91	22.79	1.91
1991	47,876	792,683	1,532,481	16.56	32.01	1.93
1992	46,460	558,301	1,314,508	12.02	28.29	2.35
1993	46,649	697,117	1,699,816	14.94	36.44	2.44
1994	45,507	648,928	1,710,412	14.26	37.59	2.64
1995	47,630	574,972	1,590,413	12.07	33.39	2.77
1996	42,715	554,625	1,410,440	12.98	33.02	2.54
1997	43,747	505,892	1,239,840	11.56	28.34	2.45
1998	43,831	612,551	1,568,676	13.98	35.79	2.56
Average	44,987	591,019	1,394,200	13.10	30.88	2.36

Source: NDOW, Statewide Angler Questionnaire Database, 1989 through 1998, cover letter dated 5 October, 2000.

The Arizona Department of Game and Fish estimated the Arizona licensed angler use for Lake Mead (based on Nevada survey results) to be 118,422 days in 1995. Combined with Nevada's use estimate for the same year, there were 693,394 angler days on Lake Mead in 1995 (83 percent from Nevada, and 17 percent from Arizona).

3.9.5.2.3 Sport Fishing in Lake Mohave

This section discusses sport fishing in Lake Mohave, below Hoover Dam. Table 3.9-12 shows the developed access sites and facilities at Lake Mohave.

Table 3.9-12
Lake Mohave Developed Recreation Facilities

Facilities	Willow Beach	Cottonwood Cove	Katherine
Ranger Station	•	•	•
Lodging	N/A	•	•
Trailer Village (fee)	N/A	•	•
Campground	N/A	•	•
Marina	•	•	•
Food Service	•	•	•
Grocery/Gift Shop	•	•	•
Gasoline	•	•	•
Picnic Area	•	•	•
Shower (fee)	N/A	•	•
Trailer Sewage Dump	•	•	•
Boat Sewage Dump	•	•	•
Self-service laundry	N/A	•	•
Propane Service	•	•	•
Houseboat Rentals	N/A	•	•

Source: NPS, 1995.
• indicates presence of improvement
N/A indicates no improvement

In Lake Mohave there are largemouth bass, striped bass, channel catfish, rainbow trout, bullhead catfish, sunfish, crappie and bluegill. Because Lake Mohave is within the LMNRA, the same fishing rules and requirements described above for Lake Mead apply to Lake Mohave. NDOW stocks rainbow trout in the lake from late December through the spring months. The USFWS stocks rainbow trout throughout the year, with concentrated stocking October through May.

Three protected species, including razorback sucker, Colorado squawfish, and bonytail chub, are the last of the native Colorado River fish and can be found in Lake Mohave.

When caught, these fish must be released. Fishing is open year round, but the best fishing generally occurs in September, October and November. For deep water trolling, March through May is best.

Fishing on Lake Mohave can be exceptional. Bass and trout often run three pounds, with some trout weighing as much as 10 or more pounds. Anglers fish for big trout at Willow Beach, while Cottonwood Cove and Katherine Landing offer both bass and trout fishing. Within the last few years, striped bass fishing has become very popular.

The NDOW conducts annual creel surveys at Cottonwood Cove and Willow Beach. In 1998, angler use for Lake Mohave was estimated at 155,654 angler days, about the same as in 1997. The 1998 lake-wide harvest was estimated at 414,954 fish. Of the species caught, 80 percent were striped bass and 12 percent were rainbow trout. Other species included largemouth bass, channel catfish, and sunfish.

3.9.5.3 ENVIRONMENTAL CONSEQUENCES

3.9.5.3.1 Sport Fishing in Lake Powell, Lake Mead and Lake Mohave

Reduced reservoir surface elevations could affect recreational reservoir fishing by decreasing the number of fishing days and angler satisfaction. The lower pool elevations could cause temporary or permanent closure or relocation of shoreline facilities, thus requiring the boat angler to either travel to another launch site, fish from the bank, or possibly forego fishing that day. Also, navigational issues, such as the closure of areas of the reservoirs, could increase travel times to desired fishing locations and result in reduced angler satisfaction. Lower pool elevations may make some shoreline fishing areas inaccessible. In addition, as discussed in Section 3.9.3.2, as pool elevations lower, the surface area available for boats and safe boat capacity decreases. The boat angler may need to call ahead for reservoir conditions. Lake Mohave surface elevations will not be affected by any of the alternatives.

No direct information on angler success rates or angler satisfaction in relationship to reservoir pool elevations is available. Therefore, potential effects were determined indirectly through consideration of potential effects on sport fishery production and water access for boat and shore anglers. The effects of the alternatives on sports fishery production are discussed in detail in Section 3.7.4. The effects on boating access, including shoreline facilities that provide access to the water for boat angling and navigational constraints on boating, are discussed in Sections 3.9.2 and 3.9.3.

As discussed in Section 3.7.4, Sport Fisheries, potential reductions in surface elevations associated with the interim surplus criteria alternatives are not expected to affect sport fishery composition or quantities within the reservoirs. As such, angler success rates at Lake Powell and Lake Mead would not be reduced.

3.9.6 RECREATIONAL FACILITIES OPERATIONAL COSTS

In order to keep reservoir marinas, boat launching, public use beaches and shoreline access operational, facility owners/operators and agencies providing utility connections must respond to fluctuating pool elevations. This section focuses on the operational and capital costs of keeping recreational facilities in operation as reservoir surface elevations change.

Potential revenue effects from changes in recreation use are not considered. As discussed above, it is not expected that baseline conditions or interim surplus criteria would result in facility closures, as most facilities can be relocated to maintain operation at lower reservoir elevations.

3.9.6.1 METHODOLOGY

Information in the affected environment section was compiled after review of available published and unpublished sources and through personal communication with NPS specialists. Available data do not cover all facilities. Furthermore, the analysis is generally based on professional judgment, extrapolating from limited historical data. However, the analysis provides a useful approximation of the order of magnitude of costs to recreational facilities that may be incurred under projections for each of the alternatives.

Using data associated with facility relocation costs, projections of the costs associated with declines were made using results of the river system modeling discussed in Section 3.3. Calculations of potential costs use model projections associated with the 50 percent exceedence probability elevations for years 2002 through 2016. This simplified methodology addresses multi-year changes in elevation, and does not consider costs associated with facility adjustments to accommodate monthly fluctuations.

3.9.6.2 AFFECTED ENVIRONMENT

The following sections discuss costs associated with relocation of reservoir marinas and boat launching facilities at Lake Powell and Lake Mead. Many of the facilities at Lake Powell and Lake Mead were constructed when the reservoirs were near their maximum pool elevations of 3700 feet msl and 1210 feet msl, respectively.

3.9.6.2.1 Lake Powell

The costs of fluctuating pool elevations on Lake Powell marinas and boat-launching facilities were calculated by Combrink and Collins (1992). The study calculated operating costs for one-foot fluctuations (termed “normal adjustments”) and for adjustments when the pool fluctuation exceeds 25 feet (termed “special adjustments”). The normal adjustments are adjustments made within the range of regular operations and are done routinely as water levels change during the year. Special adjustments

include relocations of anchors and extensions of cables and utilities. The study found that major capital investments would be needed; cost estimates were developed based on a 50-foot decline in pool elevations.

Additional data for the Antelope Point Marina has been provided by the Navajo Nation and National Park Service. Construction drawings have been prepared to allow extension of the ramp from 3677 to 3620 feet msl, with a reported capital cost estimate of approximately $500,000 (Bishop, Personal Communication, 2000). This cost has been included in NPS planning for Antelope Point.

Table 3.9-13 presents the costs incurred per adjustment in the form that the data was collected. In order to use the data to compare different alternatives, it has been converted into a cost per foot of fluctuation. Data collected in 1989 has been updated to 2000 price levels.

Table 3.9-13
Costs Associated with Adjustments to Lake Powell Recreation Facilities

Adjustment Cost Category[1]	Cost per Adjustment		Cost per Foot
	1989 Price Level [2]	2000 Price Level[3]	
Operating Cost for a Normal Adjustment (based on one-foot fluctuation)	$1,275	$1,721	$1,721
Operating Cost for a Special Adjustment (fluctuations exceeding 25 feet)	$33,460	$45,171	$1,807
Capital Cost for each 50-foot drop	$2,000,000	$2,700,000	$54,000
Total Cost per Foot			**$57,528**
Additional Capital Cost for drop below 3677 water surface elevation[4]		$500,000	

[1]. Operating costs are the cost of adjusting the existing facilities for fluctuations and consist of labor hours. Capital costs consist of construction of ramp extensions, utility line extensions and relocations.
[2] Combrink and Collins (1992).
[3] Consumer Price Index-All Urban Consumers. 1989 average is 124.0. March 2000 is 167.8. Adjustment factor: 167.8/124.0 = 1.35
[4] Capital cost to extend the toe of the existing Antelope Point Marina from 3677 to 3620 feet msl (Bishop, Personal Communication, 2000).

Table 3.9-13 indicates there are costs associated with even minor changes in pool elevations. However, the cost of capital improvements required to extend utilities and access below the range of elevations that can be accommodated by existing infrastructure is much larger than the operating costs incurred within the capacity of the existing infrastructure.

It should be noted that many of the Lake Powell shoreline facilities were extended in 1992/93 to accommodate reduced Lake Powell surface elevation down to 3612 feet msl. Due to these extensions, the actual costs of relocating facilities in the event of future

Lake Powell surface elevation declines may be lower than those indicated in the analysis.

3.9.6.2.2 Lake Mead

NPS provided information on costs associated with relocation of facilities at Lake Mead. The operating levels range between full pool elevation (1210 feet msl) and 1180 feet msl. When Lake Mead declines to 1180 feet msl, adjustments need to be made to the major facilities. Costs to make these adjustments for each of the major facilities at year 2000 price levels range from $560,000 to $970,000. NPS has also determined that additional incremental drops of 20 feet in elevation will incur additional costs, ranging from $480,000 to $800,000 (Henderson, 2000).

Costs associated with fluctuating pool elevations are available for federally-owned facilities at LMNRA from unpublished data assembled by the Resource Management Office, Lake Mead NRA (Henderson, Burke and Vanderford, April 17 and 18, 2000). In addition, Overton Beach Marina (letter dated March 29, 2000) and Lake Mead Resort (letter dated April 11, 2000) provided information to Reclamation indicating the costs associated with fluctuating reservoir elevations. Table 3.9-14 presents these costs.

Table 3.9-14
Costs Incurred to Recreational Facilities from Lake Mead Pool Fluctuations
(Year 2000 Price Level)

Line No.	Fluctuation	Cost per Increment
1	Cost to LMNRA facilities of surface elevation occurrence below 1180 feet msl [1]	$ 6,011,000
2	Cost to LMNRA facilities at 1160 feet msl and at each additional 20-foot drop [1]	$ 5,080,000
3	Cost to Lake Mead Resort Marina from a 20-foot drop in elevation [2]	$ 91,400
4	Cost to Overton Beach Marina facilities from a fluctuation from 1212 feet msl to 1150 feet msl (62 feet) [3]	$ 60,000
5	Cost to Overton Beach Marina Facilities from a fluctuation from 1150 feet msl to 1130 feet msl (20 feet) [3]	$ 425,000
6	Cost to Temple Bar Resort from a 10-foot drop [4]	$ 12,500
7	Cost to Echo Bay Resort from a 20-foot drop from 1213 feet msl to 1193 feet msl [5]	$ 38,400

[1] Unpublished data from Lake Mead NRA.
[2] Letter dated April 11, 2000, from Lake Mead Resort to Reclamation. The letter quantifies cost for a drop from current pool elevations. It also notes that a drop below 1150 would, in the NPS's judgement, require abandonment of the basin within which the resort is located.
[3] Letter dated March 29, 2000, from Overton Beach Marina to Reclamation.
[4] Letter dated March 27, 2000, from Temple Bar Resort. Midpoint of range ($10,000 to $15,000) is used. Letter further notes that a drop below 1125 feet msl would require a complete relocation of the marina, including buildings located on land.
[5] Letter dated March 16, 2000, from Echo Bay Resort to Reclamation.

3.9.6.3 ENVIRONMENTAL CONSEQUENCES

3.9.6.3.1 Lake Powell

As discussed in the methodology section, an estimate can be made of the cost impacts of the alternatives on Lake Powell recreational facilities under some basic conditions. Estimates in this section are for aggregate relocation costs associated with all identified Lake Powell shoreline facilities.

Table 3.9-15 shows estimated incremental costs that would be incurred from Lake Powell surface elevation decreases associated with the median elevation projections for baseline conditions and each alternative from 2002 through 2016 (Figure 3.9-1 presents these elevations graphically). These impacts are based on a cost of $57,528 per foot change in elevation, developed based on the information shown in Table 3.9-12.

Table 3.9-15
Costs Associated with Potential Relocation of Lake Powell Recreational Facilities
Under Alternatives Compared to Baseline Conditions[1]
(Year 2000 Price Level)

Alternative	Median Elevation in Year 2016 (feet msl)[2]	Elevation Below Baseline Conditions (feet)	Incremental Cost during 15-Year Period[3]
Baseline Conditions	3665	0	---------
Basin States Alternative	3664	1	$ 747,864
Flood Control Alternative	3665	0	$ 0
Six States Alternative	3664	1	$ 747,864
California Alternative	3660	5	$1,208,088
Shortage Protection Alternative	3659	6	$1,438,200

[1] Assumes pool elevation decreases constantly over time, following 50% probability of exceedence elevation.
[2] Based on 50 percent probability of exceedence elevation projected from modeling on July 31 of each year.
[3] Table 3.9-13. $57,528 per foot for each facility. No incremental cost is included for extending the ramp at the Antelope Point Marina..

By 2050, the median elevation of all alternatives is within a two-foot range (3662.5 to 3664.6) and the difference in costs is small.

3.9.6.3.2 Lake Mead

As discussed in the methodology section, an estimate can be made of the cost impact of the alternatives on Lake Mead recreational facilities using certain assumptions.

Table 3.9-16 shows estimated incremental costs that would be incurred from Lake Mead surface elevation decreases associated with the median elevation projections for

each alternative as compared to baseline conditions from 2002 through 2016 (Figure 3.9-4 presents the median elevations graphically).

Table 3.9-16
Costs Associated with Potential Relocation of Lake Mead Recreational Facilities Under Alternatives Compared to Baseline Conditions[1]

Alternative	Elevation in Year 2016 (feet msl)[2]	Elevation Below Baseline Conditions	Incremental Cost during 15-Year Period
Baseline Conditions	1162	N/A	NA
Basin States Alternative	1143	19	$ 5,243,900[3]
Flood Control Alternative	1162	0	0
Six States Alternative	1146	16	$ 5,243,900[3]
California Alternative	1131	31	$ 10,348,900[4]
Shortage Protection Alternative	1130	32	$ 10,773,900[5]

1 Assumes pool elevation decreases constantly over time, following 50% probability of exceedence elevation.
2 Based on 50 percent probability of exceedence elevation on December 31 of each year projected from river system modeling.
3 Lines 2, 3, 4 and 6 from Table 3.9-14.
4 Two times Line 2, one times Line 3 and 4, and three times Line 6 from Table 3.9-14.
5 Two times Line 2, one times Lines 3, 4 and 5, and three times Line 6 from Table 3.9-14.

By 2050, the median elevation under all alternatives is the same (1110.6 feet msl), and no differences in cost would occur.

3.10 ENERGY RESOURCES

3.10.1 INTRODUCTION

The analyses in this section consider two specific issues associated with energy resources. The first issue considered is potential changes in hydropower production from Hoover Dam and Glen Canyon Dam; the second is potential increases in energy requirements of the Southern Nevada Water System (SNWS) Lake Mead intake, Navajo Generating Station cooling water intake in Lake Powell and the City of Page potable water intake in Lake Powell.

3.10.2 HYDROPOWER

This section discusses potential changes in power production that could occur as a result of the interim surplus criteria under consideration. The analysis focuses on changes in production from Glen Canyon Dam and Hoover Dam for each alternative compared to baseline conditions.

3.10.2.1 METHODOLOGY

In order to determine the effects of the interim surplus criteria alternatives, the information produced from the river system modeling described in detail in Section 3.3 has been used. This model simulates operation of Glen Canyon and Hoover powerplants under baseline conditions and the interim surplus criteria alternatives. The output quantities of the model that are important in determining the effects of the alternatives on power generation are:

- Annual average Lake Powell Elevation;
- Annual average Glen Canyon Powerplant Energy Production;
- Annual average Lake Mead Elevation;
- Annual average Hoover Powerplant Energy Production;
- Annual average Lake Mohave Elevation (constant at an elevation of 647 feet msl throughout the period of analysis).

These quantities, derived from the model runs, are shown in Tables 1, 2, 5 and 7 in Attachment P. In addition, powerplant capability curves for Glen Canyon and Hoover powerplants showing powerplant capacity as a function of lake elevation (or net effective head) are required to determine how the capacity varies for each alternative throughout the study period. Powerplant capability curves used for the analysis are presented in Tables 3 and 4 in Attachment P.

Table 3 of Attachment P uses discharge multipliers to determine the maximum operable capacity of the Glen Canyon Powerplant. The maximum water release of 25,000 cfs (restricted except during power system emergencies) is divided by the discharge multiplier to calculate the capacity. Table 4, for Hoover Powerplant, uses the theoretical turbine curve data for heads from 560 feet to 590 feet. Below 560 feet of head, a ratio of 2062/2074 has been applied to the turbine curve data to reflect recent downratings of units A3, A4, and A8 as reported in a letter dated July 2000, from the Area Manager of Reclamation to Western.

As used herein, powerplant capacity refers to the load that a generator or facility can achieve at a given moment. Energy is a measure of electric capacity generated over time. Comparing the projected amount of powerplant generating capacity and energy production available under the various alternatives with baseline projections produces a probabilistic measure of the effects of the alternatives on power production if the assumptions contained in the forecasts covering water supply materialize.

The methodology for determination of the effects of the alternatives is to compare the change in capacity and energy production, on an annual basis, between baseline conditions and each alternative. Annual average generating capacity and energy available from Glen Canyon and Hoover powerplants was determined using the reservoir elevation and energy output quantities from system modeling discussed in Section 3.3, and the powerplant capability curves. Modeling of energy production is based on aggregate turbine production curves. Annual average capacity and energy production for baseline conditions and the alternatives are shown in Tables 5 and 7 in Attachment P. Annual average energy production is also shown in Figures 3.10-1 and 3.10-2. Comparisons of the annual average energy production associated with each alternative and the annual average energy production of baseline conditions are shown in Tables 6 and 8 in Attachment P.

3.10.2.2 AFFECTED ENVIRONMENT

The energy resources that could be affected by changes in Colorado River operation are Glen Canyon Powerplant and Hoover Powerplant electrical power output. The reservoirs behind these facilities are operated to store Colorado River water for delivery in the Lower Colorado River Basin below Glen Canyon Dam, and water to meet delivery obligations to Arizona, California, Nevada and Mexico downstream of Hoover Dam.

3.10.2.2.1 Factors of Power Production

In general, the two factors of a hydroelectric system, excluding machinery capability, that are directly related to power production are the net effective head on the generating units, and the quantity of water flowing through the turbines.

The net effective head is the difference between the water surface elevations of the forebay behind a dam and in the tailwater below the dam. The head determines the maximum capacity, measured in MW, that is available from the powerplant. The nameplate capacity of Glen Canyon Powerplant is 1296 MW. However, the maximum operating capacity of Glen Canyon Powerplant generators is approximately 1200 MW due to turbine restrictions (Western, 1998). Because the maximum allowable water release has been limited to 25,000 cfs, the maximum operable capacity for Glen Canyon is limited to 1048 MW, except during a power system emergency. The maximum operating capacity of Hoover Powerplant is 2074 MW. The net effective head on the powerplant is influenced by the reservoir surface elevations and operating strategies for both the upstream and downstream reservoirs.

The quantity of water flowing through the turbines (water releases) determines the amount of energy produced, measured in gigawatt-hours (GWh). The net energy generated during fiscal year 1998 from Glen Canyon Powerplant and Hoover Powerplant was 6626 GWh and 5768 GWh, respectively (Western, 1998 and Reclamation, 2000).

The turbines at a powerplant are designed to produce maximum efficiency at a design head. At design head, the plant can produce the maximum capacity and the most energy per acre-foot of water passing through the turbine. As the net effective head on the powerplant is reduced from design head because of reduced forebay (upstream reservoir) elevation, the power output of the turbine is reduced, the electrical capacity of the generator attached to the turbine is reduced, and the efficiency of the turbine is reduced. This reduction continues as net effective head decreases until, below the minimum elevation for power generation, the turbines cannot be operated safely and must be bypassed for downstream water deliveries. Minimum power elevation generally occurs at a point where cavitation within the turbine causes extremely rough operation, air may become entrained in the water, and/or vortices may appear in the forebay.

3.10.2.2.2 Power Marketing and Customers

The effects of any surplus or deficit in power generation are incurred by the customers to whom the power from Glen Canyon and Hoover powerplants is allocated. The contracts for power from Glen Canyon Dam terminate in 2025. The contracts for power from Hoover Dam terminate in 2017. The identity of the recipients of power from these resources is not known for about two-thirds of the period of analysis for Hoover Dam and about one-half of the period of analysis for Glen Canyon Dam. Therefore, an analysis of the effects of the alternatives compared with those of baseline conditions will consider the general effects in the overall areas served by the resources, although a future group of power customers would be impacted similarly to current customers.

The states that would be affected by changes in energy and capacity at Glen Canyon and Hoover powerplants are Arizona, California, Nevada, Utah, Wyoming, New

Mexico and Colorado. These states make up the Rocky Mountain, Arizona-New Mexico-Southern Nevada, and California-Mexico areas of the Western Systems Coordinating Council (WSCC). Electrical energy produced in each of these areas is derived from a variety of sources. The power from Glen Canyon Powerplant and Hoover Powerplant contributes a small, but significant portion of the energy produced in these areas. The total generation capability of the areas as of January 1, 1999, is 86,348 MW. The generation capability of each WSCC area is:

- Rocky Mountain 10,584 MW
- Arizona-New Mexico-Southern Nevada 22,272 MW
- California-Mexico 53,492 MW

Glen Canyon and Hoover powerplants contribute approximately 3.6 percent of the total generating capability of these three areas of WSCC (WSCC, 1999). The maximum capacity available from Glen Canyon Powerplant at elevation 3700 feet msl has been restricted to approximately 1200 MW. However, as stated above, the maximum operable capacity at Glen Canyon Powerplant is limited to 1048 MW due to water release restrictions, except during power system emergencies. Therefore, for the purposes of this analysis, the operable capacities of Hoover and Glen Canyon powerplants are 2074 MW and 1048 MW, respectively, for a total of 3122 MW.

3.10.2.3 Environmental Consequences

The environmental consequences of a change in river operations that impacts power production can be measured by the increase or decrease in capacity and energy available from the powerplants. The power production under the alternatives is compared with power production under baseline conditions to determine the incremental effects of each alternative, using annual average modeled reservoir levels and downstream releases. Reductions in capacity, energy, and generation ancillary services from Glen Canyon and Hoover powerplants under baseline conditions would ultimately need to be replaced by either types of generation. Additional incremental reductions under each alternative would also ultimately need to be replaced.

The replacement of Glen Canyon and Hoover powerplant generation could be accomplished through a number of different strategies. If capacity loss can be expected for long periods of time, construction of new generation would likely occur. If capacity loss is intermittent throughout the period of analysis, purchases from the short-term market would be expected. If energy loss can be expected for a long period of time, either construction of new generation or operation of higher-cost generation for longer periods of time during the day would be expected. If energy loss is intermittent throughout the period of analysis, replacement from the short-term market would be anticipated.

3.10.2.3.1 Baseline Conditions

3.10.2.3.1.1 Glen Canyon Dam

The annual average capacity and energy production at Glen Canyon Dam under baseline projections are shown in Table 5 in Attachment P; the annual average energy production is shown in Figure 3.10-1. The powerplant capacity begins at 1020 MW in 2002 and is reduced to 960 MW in 2016 because of reductions in lake elevation. Subsequently, the capacity increases to 990 MW in 2041, then decreases to 975 MW in 2050. From 2002 through 2016, the greatest annual decrease in capacity is 13 MW between 2012 and 2013. The annual reduction throughout the early years is from two to six MW, representing less than a one percent decline in capacity from the powerplant per year. The output varies cyclically between 2017 and 2050, with annual increases or decreases in capacity of two to six MW.

Under baseline conditions, the energy available from Glen Canyon Dam averages 4532 GWh from 2002 through 2016, and 4086 GWh through the rest of the period of analysis. Energy production increases the first year of the study. Thereafter, annual reductions in energy production are generally less than 50 GWh per year through 2016. Annual reductions in energy from 2017 through 2050 are generally less than 40 GWh.

3.10.2.3.1.2 Hoover Dam

The annual capacity and energy production at Hoover Powerplant under baseline conditions are shown in Table 7 of Attachment P; the annual average energy production is shown in Figure 3.10-2. The powerplant capacity begins at 2062 MW in 2002 and is reduced to 2033 MW in 2016 because of reductions in lake elevation. Capacity decreases to 1865 MW in the year 2050. From 2002 through 2016, the greatest annual decrease in capacity is nine MW. This reduction represents less than a one percent per year decline in capacity from the powerplant through 2016. From 2017 through the remainder of the period of analysis, the annual capacity reductions are generally less than 10 MW.

The energy available from Hoover Powerplant averages 4685 GWh from 2002 through 2016, and 3903 GWh through the rest of the period of analysis. Energy production increases during the first three years of the period of analysis, with annual reductions from 2004 through 2016 of generally less than 50 GWh. Annual reductions in energy from 2017 through 2050 are predominantly less than 60 GWh.

Figure 3.10-1
Glen Canyon Powerplant
Annual Average Energy Production

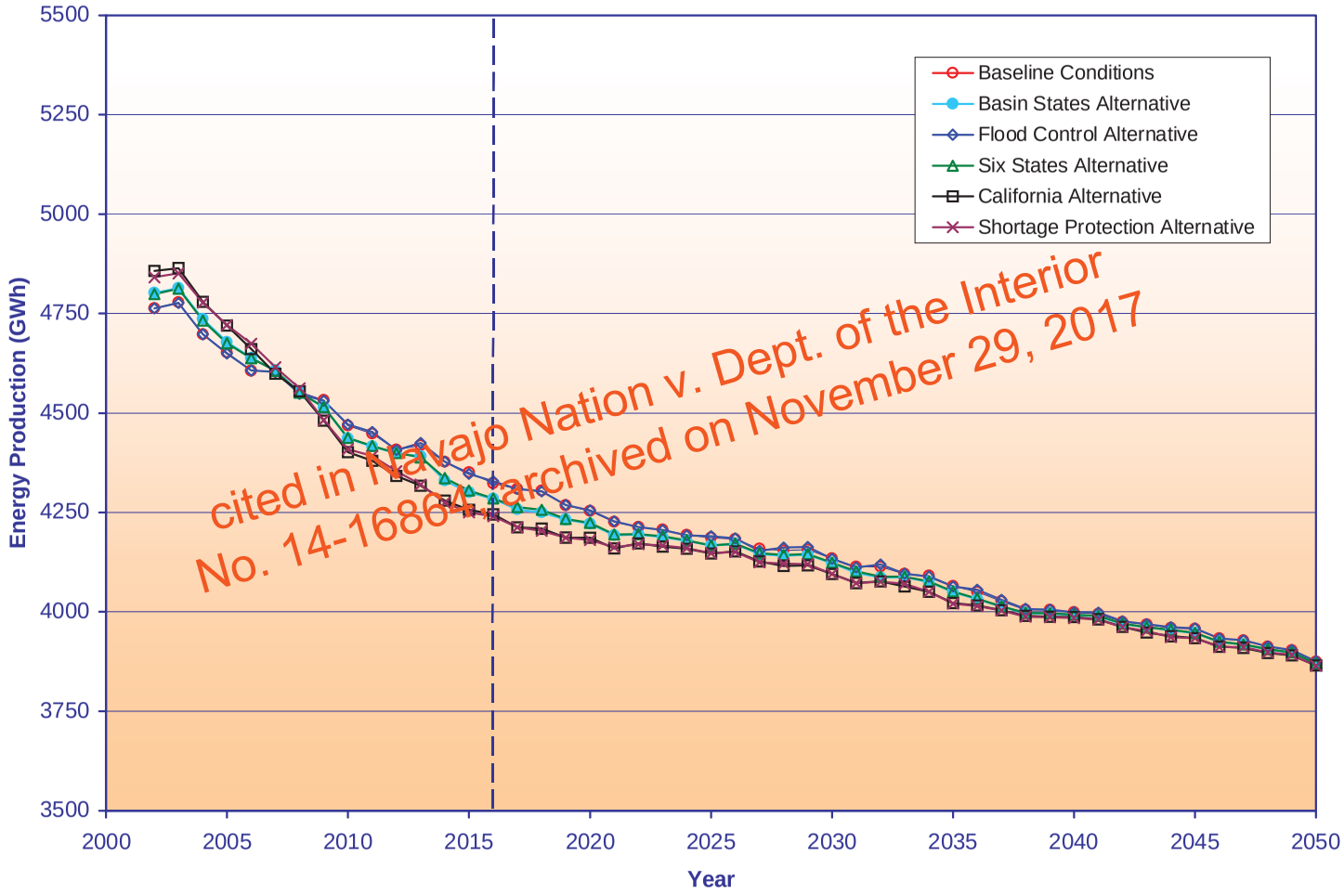
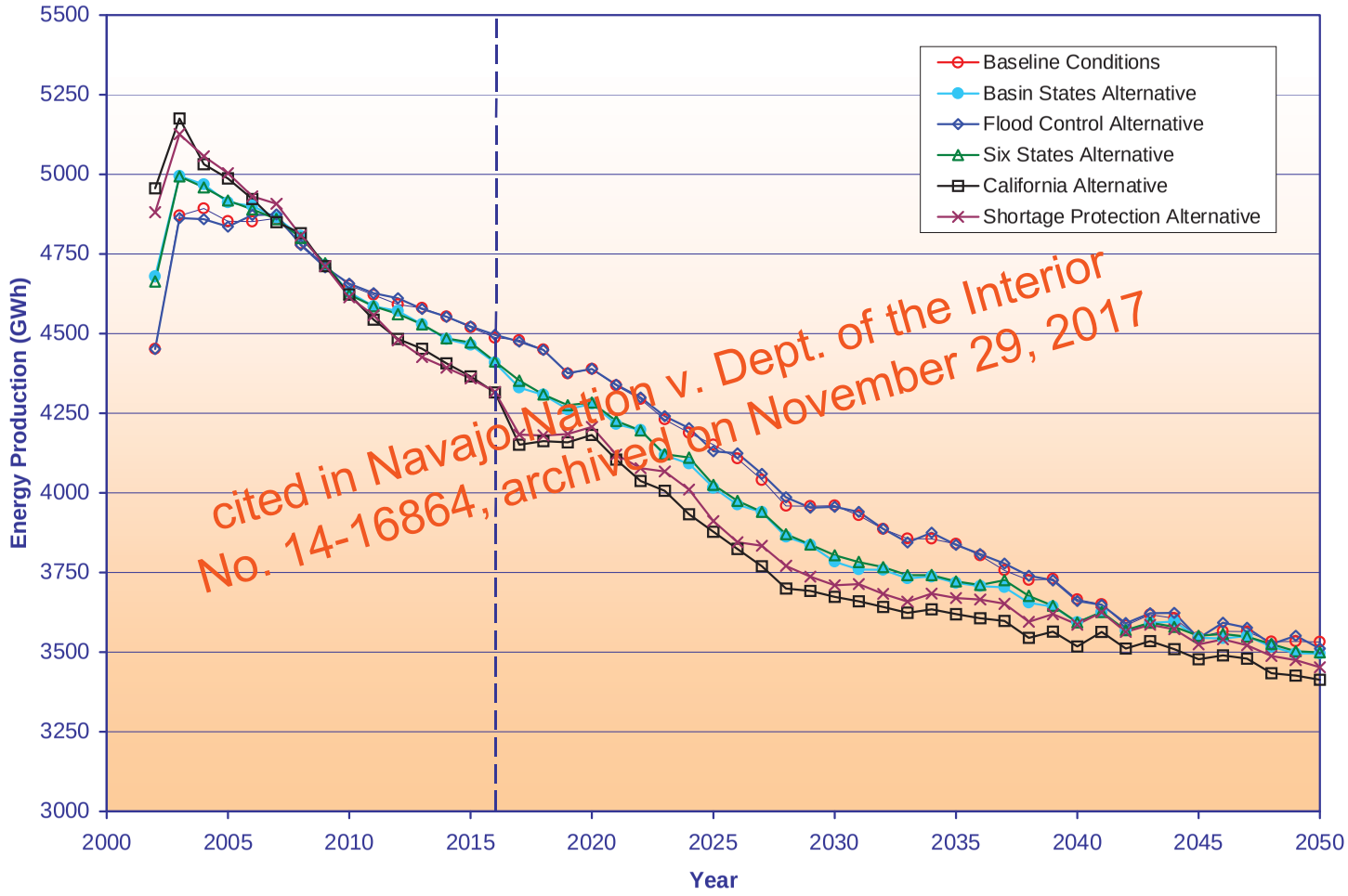


Figure 3.10-2
Hoover Powerplant
Annual Average Energy Production



3.10.2.3.1.3 Combined Capacity and Energy Reduction Under Baseline Conditions

The combined capacity reduction from Glen Canyon and Hoover powerplants through 2016 is 89 MW under baseline conditions. The combined energy production in 2016 is 403 GWh less than year 2002 energy production. In 2050, the capacity reduction is 242 MW less than 2002 levels, and the energy available is reduced 1807 GWh from year 2002 production. Under baseline conditions, power customers can expect a reduction in production from present levels in the future. Because of the gradual withdrawal over time, the deficit is expected to be replaced by short-term purchases made by either the power customers or Western, at the power customer's option, in accordance with contract terms.

3.10.2.3.2 Basin States Alternative

3.10.2.3.2.1 Glen Canyon Dam

The average capacity available from Glen Canyon Powerplant under the Basin States Alternative is shown in Table 5 of Attachment P. The powerplant capacity begins at 1014 MW in 2002 and is reduced to 960 MW in 2016. The capacity varies two to four MW each year until 2050, at which time powerplant capacity is at 975 MW. The average annual capacity available through the period of analysis is 987 MW.

The annual energy available averages 4527 GWh in the early years through 2016, and 4209 GWh throughout the period of analysis. Annual energy production in 2050 is 3875 GWh.

3.10.2.3.2.2 Hoover Dam

The average capacity available from Hoover Powerplant is shown in Table 7 of Attachment P. The powerplant capacity begins at 2061 MW in 2002 and is reduced to 1971 MW in 2016. The capacity either increases or decreases in consecutive years by up to 44 MW, with the capacity in 2050 being 1865 MW. The average capacity available throughout the period of analysis is 1935 MW.

The average annual energy available is 4701 GWh through 2016, and 4087 GWh throughout the period of analysis. Annual energy production in 2050 is 3496 GWh.

3.10.2.3.3 Flood Control Alternative

3.10.2.3.3.1 Glen Canyon Dam

The average capacity and energy available from Glen Canyon Powerplant under the Flood Control Alternative are shown in Table 5 of Attachment P. The powerplant capacity begins at 1020 MW in 2002 and is reduced to 962 MW in 2016. The decline continues to 975 MW in the year 2050. From 2002 through 2016, the greatest annual decrease in capacity is 12 MW. This reduction represents less than a one percent

average decline in powerplant capacity per year through 2016. The capacity either increases or decreases in consecutive years through the remainder of the period of analysis. Capacity changes from the period 2016 through 2050 are predominantly in the two to six MW range each year, either increasing or decreasing.

Annual energy production from Glen Canyon averages 4532 GWh in the early years through 2016 and averages 4223 GWh throughout the period of analysis. Annual energy production in 2050 is 3875 GWh.

3.10.2.3.3.2 Hoover Dam

The annual capacity and energy available from Hoover Powerplant under the Flood Control Alternative are shown in Table 7 of Attachment P. The powerplant capacity begins at 2062 MW in 2002 and is reduced to 2033 MW in 2016. Powerplant capacity continues on a declining trend, until the capacity reaches 1865 MW in 2050. The greatest declines in the period from 2002 through 2016 are five and 13 MW, with the annual decline in capacity being predominantly one to two MW.

Under the Flood Control Alternative, the annual energy available from Hoover Powerplant averages 4686 GWh during the period 2002 through 2016. The average for the period from 2017 through 2050 is 3908 GWh. The average for the entire study period is 4146 GWh.

3.10.2.3.4 Six States Alternative

3.10.2.3.4.1 Glen Canyon Dam

The capacity available from Glen Canyon Powerplant under the Six States Alternative begins at 1014 MW in 2002 and decreases to 960 MW in 2016. The capacity then follows a generally increasing trend through 2043, after which annual reductions lead to a capacity of 975 MW in 2050. The capacity available averages 980 MW throughout the period of analysis. Annual changes of between two and five MW are predominant in the Six States Alternative.

The annual energy production averages 4527 GWh through 2016, and 4211 GWh throughout the period of analysis. Annual energy reductions throughout the period of analysis are predominantly less than 50 GWh.

3.10.2.3.4.2 Hoover Dam

The capacity available from Hoover Powerplant under the Six States Alternative begins at 2061 MW in 2002 and decreases to 2005 MW in 2016. The capacity then follows a decreasing trend until the output reaches 1865 MW in 2050. The predominant annual capacity reductions throughout the study period are less than 10 MW.

The average annual energy production is 4698 GWh through 2016. The average annual energy production throughout the period of analysis is 4091 GWh. Annual energy production reductions in successive years are predominantly less than 50 GWh.

3.10.2.3.5 California Alternative

3.10.2.3.5.1 Glen Canyon Dam

The capacity available from Glen Canyon Powerplant under the California Alternative begins at 1007 MW in year 2002, and is reduced to 958 MW in 2016. The capacity follows a generally increasing trend from 2016 through the end of the period of analysis. In 2050, the capacity is 975 MW. Annual changes in plant capacity are generally between two and five megawatts.

Energy production at Glen Canyon averages 4516 GWh through 2016, and 4193 GWh throughout the entire period of analysis. Annual changes in energy production are generally less than 30 GWh.

3.10.2.3.5.2 Hoover Dam

The capacity available from Hoover Powerplant under the California Alternative begins at 2061 MW in year 2002, and is reduced to 1907 MW in 2016. The capacity follows a generally downward trend from 2016 through the end of the period of analysis. In 2050, the capacity of Hoover is 1867 MW. Annual changes in plant capacity are generally less than 10 megawatts.

Annual energy production at Hoover averages 4709 GWh through 2016, and 4016 GWh throughout the period of analysis. Annual changes in energy production are predominantly less than 20 GWh.

3.10.2.3.6 Shortage Protection Alternative

3.10.2.3.6.1 Glen Canyon Dam

The capacity available from Glen Canyon Powerplant under the Shortage Protection Alternative begins at 1009 MW in 2002 and is reduced to 958 MW in the year 2016. The capacity generally increases to 988 MW in the early 2040s, then is reduced to 975 MW in the year 2050. Annual capacity variations are generally from two to six megawatts.

Energy production averages 4518 GWh through 2016, and 4193 GWh throughout the entire study period. Annual energy production variations are generally less than 30 GWh.

3.10.2.3.6.2 Hoover Dam

The capacity available from Hoover Powerplant under the Shortage Protection Alternative begins at 2061 MW in 2002 and is reduced to 1904 MW in 2016. The capacity follows a generally decreasing trend from 2016 through 2050, when the capacity reaches 1865 MW. Annual capacity reductions are predominantly in the two to five megawatt range.

Annual energy production averages 4733 GWh from the beginning of the period of analysis to 2016, and 4047 GWh throughout the entire period of analysis. Annual variation throughout the period of analysis is generally less than 100 GWh.

3.10.2.4 COMPARISON OF ALTERNATIVES

As discussed above, the amounts of capacity and energy available as a result of each alternative operating strategy vary on an annual basis. The important measurement of the effects of each alternative is their comparison with the baseline conditions. As indicated, the resources available from Glen Canyon and Hoover powerplants can be expected to be reduced over time, due primarily to increased depletions in the Upper Basin states. This effect is included in model runs for baseline conditions.

Table 3.10-1 summarizes the differences between hydropower capacity and energy generation under each alternative and under baseline conditions. Values under the Flood Control Alternative are typically slightly greater than under baseline conditions. Values under the California and Shortage Protection Alternatives are the furthest from baseline conditions, while values under the Six States and Basin States alternatives are closer to baseline conditions.

The capacity and energy differences (reductions) between each alternative and baseline conditions would be replaced by power available from the market. The greatest single-year difference in energy generation at Glen Canyon Powerplant under any of the alternatives as compared to baseline conditions is 102 GWh, under the California and Shortage Protection Alternatives (see Table 6 of Attachment P) or about 2.5 percent of the modeled average annual generation of Glen Canyon. The effects of interim surplus alternatives are greater at Hoover Powerplant. The greatest single-year difference in annual energy generation under any of the alternatives as compared to baseline conditions is 328 GWh under the California Alternative (see Table 8 of Attachment P), or about eight percent of the modeled average annual energy generation. The average annual generation during the period of analysis under the Preferred (Basin States) Alternative is 0.8 percent (0.3 percent at Glen Canyon and 1.3 percent at Hoover) less than under baseline conditions. The quantities of capacity needed to replace reductions, while not significant when compared to the total capacity installed in the three WSCC regions, may be significant to the entity losing the capacity.

Table 3.10-1
Hydropower Capacity and Energy – Comparison of Alternatives to Baseline Conditions[1]
(Difference between baseline conditions and each alternative[2])

Alternative	2002 – 2016 Average Annual		2017 – 2050 Average Annual		2002 – 2050 Average Annual	
	Capacity (MW)	Energy (GWh)	Capacity (MW)	Energy (GWh)	Capacity (MW)	Energy (GWh)
Glen Canyon Powerplant						
Basin States Alternative	-10	-5	-1	-16	-4	-13
Flood Control Alternative	0	0	0	1	0	1
Six States Alternative	-10	-5	-1	-15	-4	-12
California Alternative	-21	-16	-1	-35	-8	-30
Shortage Protection Alternative	-21	-14	-1	-36	-7	-29
Hoover Powerplant						
Basin States Alternative	-14	15	-14	-87	-14	-56
Flood Control Alternative	1	0	1	5	1	3
Six States Alternative	-11	13	-12	-80	-12	-51
California Alternative	-47	24	-23	-193	-30	-127
Shortage Protection Alternative	-45	20	-20	-147	-28	-96
Total						
Basin States Alternative	-24	10	-15	-103	-18	-69
Flood Control Alternative	1	0	1	6	1	4
Six States Alternative	-21	8	-13	-95	-16	-63
California Alternative	-68	8	-24	-228	-38	-157
Shortage Protection Alternative	-66	6	-21	-183	-35	-125

[1] Appendix P, Tables 8 and 10 compare each alternative to baseline conditions.
[2] Positive (negative) value indicates that cost is higher (lower) under the alternative.

At Glen Canyon, the greatest single-year difference in capacity compared to baseline conditions is 36 MW under the Shortage Protection Alternative (see Table 6 of Attachment P). This amount represents a decrease of 3.5 percent from baseline conditions and approximately 0.3 percent of the installed capacity in the Rocky Mountain Area. At Hoover, the greatest single-year difference in capacity compared to baseline conditions is 137 MW under the California Alternative (see Table 8 of Attachment P). This amount represents a decrease of 6.7 percent from baseline conditions and about 0.2 percent of the installed capacity in the three-state marketing area for Hoover.

Additional water releases resulting from four of the five alternatives (all but the Flood Control Alternative) under consideration will increase the energy available from the powerplants during the first two to seven years of the interim period. This can be expected to reduce energy purchases by the customers from alternate, higher priced

resources. Future reductions in power production can be expected to necessitate increased purchases of capacity to meet peak loads and reserves. Purchases of replacement power by power customers would result in changes in costs and increased exposure to market volatility.

3.10.3 SOUTHERN NEVADA WATER SYSTEM LAKE MEAD INTAKE ENERGY REQUIREMENTS

This section discusses potential increases in operating costs of the SNWS Lake Mead intakes that could occur as a result of implementation of the interim surplus criteria alternatives. Increased pumping costs could occur if the alternatives cause lower Lake Mead water surface elevations than baseline conditions.

3.10.3.1 METHODOLOGY

River system modeling, described in detail in Section 3.3, provided the average monthly elevation of Lake Mead for each year during the study period for baseline conditions and each of the alternatives. These elevations are shown in Table 2 of Attachment P. Increases or decreases in net effective pumping head correspond to decreases or increases in Lake Mead Surface elevations. The net effective pumping head differences between the baseline and the alternative strategies are also shown in Table 2 of Attachment P. Using an estimate prepared by SNWA (Johnson, 2000) for incremental pumping costs of $28,000 per year associated with each foot of increased pumping head, the increased cost of each alternative is shown in Table 2 of Attachment P.

3.10.3.2 AFFECTED ENVIRONMENT

The State of Nevada, through the SNWA, diverts most of its allocation of Colorado River water from Lake Mead through the SNWS into the Las Vegas Valley and adjacent areas. The power-consuming features of this system are the pumping plants from Lake Mead to the water treatment facility. The energy required to provide this lift is a function of the net difference in elevation between the Lake Mead water surface and the water treatment facility. Any increase in the net effective pumping head would increase the amount of energy required to pump each acre-foot of water from Lake Mead. The net effective pumping head will increase as the Lake Mead elevation falls. Water users in Clark County, Nevada and possibly others would absorb increased costs associated with water supply.

3.10.3.3 ENVIRONMENTAL CONSEQUENCES

The difference in net effective pumping head between each alternative and baseline projections is used to determine the effects of each alternative on pumping cost. The following analysis uses the estimate of $28,000 per year per foot increase in net effective pumping head furnished in the aforementioned letter. Baseline pumping costs were not calculated.

3.10.3.3.1 Baseline Conditions and Alternatives

Under baseline conditions, the average elevation of Lake Mead declines from 2002 through 2050. These results indicate that under baseline conditions and each of the alternatives, SNWA can expect pumping costs to increase due to the increase in net effective pumping head. Table 3.10-2 summarizes potential differences between pumping costs under the alternatives and baseline conditions.

Table 3.10-2
Southern Nevada Water System Lake Mead Intake Energy Requirements
Average Annual Power Cost – Comparison of Alternatives to Baseline Conditions[1]
(Differences between baseline conditions and each alternative)

Alternative	2002-2016	2017 - 2050	2002 - 2050
Basin States Alternative	$ 229,395	$ 94,352	$ 135,691
Flood Control Alternative	$ -32,685	$ -21,025	$ -24,594
Six States Alternative	$ 214,779	$ 88,027	$ 126,829
California Alternative	$ 544,843	$ 205,652	$ 309,486
Shortage Protection Alternative	$ 532,635	$ 170,314	$ 281,229

[1] $28,000/per year per foot increase in net effective pumping head at year 2000 price level
[2] Positive (negative) value indicates that cost is higher (lower) under the alternative.

The Flood Control Alternative, when compared to baseline conditions, results in reduced costs for SNWA to pump Colorado River water into its system. The Basin States and Six States alternatives result in average pumping cost increases of about $130,000 per year over the entire period of analysis. The California Alternative and the Shortage Protection Alternative result in average pumping cost increases of about $300,000 per year over the entire period of analysis.

3.10.4 INTAKE ENERGY REQUIREMENTS AT LAKE POWELL

This section discusses potential changes in pumping costs for two entities that pump water from Lake Powell: the Navajo Generating Station which obtains cooling water from Lake Powell, and the City of Page which obtains municipal water from Lake Powell. Incremental differences in pumping costs are associated with differences in modeled average Lake Powell surface elevations between baseline conditions and alternatives.

3.10.4.1 METHODOLOGY

River system modeling, described in detail in Section 3.3, provided the average elevation of Lake Powell for each year during the study period for baseline conditions and for each of the alternatives. Increases or decreases in net effective pumping head correspond with decreases or increases in Lake Powell surface elevations. Lake Powell elevations and the net effective pumping head differences between baseline conditions and the alternatives are shown in Table 1 of Attachment P. Estimates of the differences

in pumping costs were calculated using these changes in pumping head, as well as estimates of annual water use, unit energy costs and pump efficiency.

The formula for calculating energy requirements (E) as a function of pump lift (H) is:

$$E = V * 1.024 * (H/e)$$

Where V is the volume of water pumped and e is pump efficiency.

3.10.4.2 AFFECTED ENVIRONMENT

The Navajo Generating Station is a 2250 MW, coal-powered plant jointly owned by Reclamation, Salt River Project, Los Angeles Department of Water and Power, Arizona Public Service Company, Nevada Power and Tucson Electric Power. The Salt River Project (SRP) operates the plant. The SRP projects that water use will be approximately 29,000 afy in the future. Power for the intake pumps is obtained from auxiliary power units at the Generating Station at a cost of $0.0104 per kWh. Pump efficiency is estimated by SRP at 75 percent. (Weeks, 2000)

The City of Page provides municipal water to approximately 7800 residents from Lake Powell. The intake pump station is operated by Reclamation using power produced at the Glen Canyon Power Plant. Municipal water use in Page is dominated by residential use with substantial residential landscape irrigation. A negligible amount of treated water is delivered by the city to Reclamation for use at the dam. Presuming 275 gallons per day per resident, annual use would be approximately 2400 afy. An overall efficiency of 75 percent for the pump station was used as a reasonable estimate. A cost of $0.03 per kWh was estimated as the cost of the electricity.

3.10.4.3 ENVIRONMENTAL CONSEQUENCES

The difference in net effective pumping head between each alternative and baseline projections was used to determine the effects of each alternative on pumping cost. Baseline pumping costs were not calculated.

Under baseline projections, the average elevation of Lake Powell declines from elevation 3685 feet msl in year 2002 to elevation 3661 feet msl in year 2050 (Appendix P, Table 1). Table 3.10-3 compares the annual power costs of each alternative to baseline conditions.

As Lake Powell water elevations are within hundredths of a foot for baseline conditions and for the Flood Control Alternative, no change in pumping costs would occur. For all other alternatives, Lake Powell water elevations average less than under baseline conditions. Average pumping costs would be higher for both the Navajo Generating Station (average increase of $808 per year over the period of analysis for the Basin States Alternative) and for the Reclamation-operated raw water intake serving the City

of Page. (Average increase of $193 per year over the period of analysis for the Basin States Alternative).

Table 3.10-3
Intake Energy Requirements at Lake Powell
Average Annual Power Cost – Comparison of Alternatives to Baseline Conditions (Difference between baseline conditions and each alternative)

Alternative	2002–2016	2017–2050	2002–2050
Navajo Generating Station Intake Energy Requirements[1]			
Basin States	$ 2,216	$ 186	$ 808
Flood Control	0	0	0
Six States	2,129	172	771
California	4,651	303	1,634
Shortage Protection	4,660	312	1,643
City of Page Municipal Water Supply[2]			
Basin States	$ 529	$ 44	$ 193
Flood Control	0	0	0
Six States	508	41	184
California	1,110	72	390
Shortage Protection	1,112	74	392

[1] E(kWh) = 1.024 * 29,000 * (H/0.75). Cost = E(kWh) * $ 0.0104
[2] E(kWh) = 1.024 * 2,400 * (H/0.75). Cost = E(kWh) * $ 0.03
Estimates are annual averages for the indicated time periods.

3.11 AIR QUALITY

3.11.1 INTRODUCTION

Adoption of interim surplus criteria would not involve new construction or physical activities that would result in air emissions within the area of potential effect considered in this FEIS. Air quality effects discussed in this FEIS are limited to changes in fugitive dust emissions that could result from changes in exposed reservoir shoreline as a result of potential changes in Lake Mead and Lake Powell water surface elevations.

3.11.2 FUGITIVE DUST FROM EXPOSED SHORELINE

This air quality analysis provides an overview of ambient air quality in the project area, as well as a qualitative review of the potential changes in fugitive dust emissions associated with the project alternatives when compared to fugitive dust emissions that may occur under baseline projections.

3.11.2.1 METHODOLOGY

Variations in fugitive dust emissions can result from changes in the area of exposed shoreline due to changes in water operating levels. The amounts of fugitive dust generated per acre of exposed shoreline vary depending upon soil characteristics and other factors such as moisture content, wind speed, direction, and local topography. In developing a methodology for reviewing fugitive dust emission potential from exposed shoreline around Lake Powell and Lake Mead, the following assumptions were made:

- The incremental changes in exposed shoreline area are related to incremental changes in water surface elevation as indicated by existing reservoir area - elevation data. However, the true area of exposed shoreline terrain is also affected by the slope of the terrain along the shoreline. To account for sloping terrain, an average shoreline slope of 30 degrees and 45 degrees from horizontal was assumed for Lake Mead and Lake Powell, respectively.

- Incremental changes in fugitive dust emissions are directly proportional to the changes in exposed shoreline area. Although some portions of exposed area would have varying potential to generate fugitive dust, it is assumed that these areas are distributed proportionally throughout the potential range of reservoir surface elevations. Therefore, exposed areas were assumed to have a similar emission rate for a given amount of exposed shoreline. It should be noted, however, that estimated fugitive dust emissions were not calculated for this analysis, and it is likely that certain areas of the exposed shoreline would be expected to have higher emission rate factors than others. For example, delta areas with high amounts of fine sediment deposit would be a more likely source of fugitive dust generation than more compact or rocky soils at other exposed locations.

Based on these assumptions and using modeling results associated with projected median surface elevations for Lake Powell and Lake Mead, potential changes in shoreline exposure under baseline conditions and the interim surplus criteria alternatives were identified.

3.11.2.2 AFFECTED ENVIRONMENT

Ambient conditions in the Las Vegas (Lake Mead) area are characterized by low annual precipitation and generally light winds. Windrose data for the Las Vegas area for the period 1992 through 1996 indicate the predominant wind directions to be from the west, southwest, and south (i.e., away, rather than toward the Las Vegas metropolitan area) throughout the year. Wind speeds are less than five miles per hour (mph) for approximately 25 percent of the year and greater than 25 mph for less than one percent of the year. The average wind speed is approximately nine mph. Ambient conditions are similar for the Lake Powell area. Windrose data for Page, Arizona for the period 1992 through 1996 indicates there is no predominant wind direction. Rather, wind direction is somewhat evenly distributed, with the exception of winds from the southeast occurring less frequently. Wind speeds are less than five mph for more than 65 percent of the year and greater than 20 mph for less than one percent of the year. The average wind speed is less than five mph.

Lake Mead is located on the Nevada (Clark County)/Arizona (Mohave County) border. Air quality regulations, including implementation of the federal Clean Air Act, in the Lake Mead area are administered by the Clark County Air Pollution Control Division (Nevada) and the Arizona Department of Environmental Quality (ADEQ). Air quality regulations in the Lake Powell area, which is located on the Arizona/Utah border, are administered by the ADEQ and the Utah Department of Environmental Quality, Division of Air Quality.

Pursuant to the federal Clean Air Act, as amended in 1990, the EPA has established National Ambient Air Quality Standards (NAAQS) for a number of air pollutants, which are considered harmful to public health or the environment. There are two types of NAAQS, primary and secondary. Primary standards are designed to set limits for the protection of public health, including the health of sensitive populations (receptors) such as asthmatics, children and the elderly. Secondary standards are designed for the protection of the public welfare, including visibility as well as damage to animals, crops, vegetation and buildings. The EPA has established annual average and 24-hour average NAAQS for particulate matter of less than 10 microns in diameter (PM_{10}) and particulate matter of less than 2.5 microns in diameter ($PM_{2.5}$). Although the PM_{10} standards have been in effect for some time, the $PM_{2.5}$ standards are more recent (1997). Because development of baseline data for the latter is an ongoing effort and final implementation of the $PM_{2.5}$ standards may not occur for years, the discussion of fugitive dust emissions focuses on PM_{10}, which are more commonly understood and encompass $PM_{2.5}$ emissions in any event.

Fugitive dust emissions such as those from exposed reservoir shorelines can contribute to PM_{10} concentrations. To the extent that exposed shoreline is characterized by relatively fine or light soils, fugitive dust emissions can result. However, given the apparent nature of the reservoir shorelines (more gravel surface than soil) and the relatively low average winds in the reservoir areas, soil materials from exposed shoreline areas do not appear to result in significant fugitive dust emissions.

Another possible source of particulate emissions is from the deposition of dried plant material left along the shoreline as the water level recedes. Given the nature of the lakes' bottom compositions and the relatively slow rate of reservoir water level decreases, it is unlikely that this type of emissions source would be significant. The lakes do not appear to contain high levels of algae, and the water levels are projected to decline by a few feet per year (relative to baseline conditions). At this rate, algae or other forms of plant matter would be likely to recede with the water rather than be deposited along the shoreline.

Particulate emissions in the Lake Mead and Lake Powell areas do not appear to be a significant problem. While some urban areas (including Las Vegas, North Las Vegas and Henderson) within Clark County are not in attainment of the NAAQS for PM_{10}, the rest of the county, including Lake Mead, is in attainment of the standard. The portion of Mohave County adjacent to Lake Mead is also in attainment of the PM_{10} standard. The northern central Arizona and southern Utah area, including Lake Powell, is also in attainment of the PM_{10} standard. This attainment status corresponds with windrose information for both areas (i.e., relatively low average wind speeds implying low wind blown dust emissions on average) and the relatively low levels of dust generated from human activities.

Since both lake areas are used primarily for recreational purposes, there are limited sensitive receptor population concentrations such as asthmatics, children or elderly living in these areas.

3.11.2.3 ENVIRONMENTAL CONSEQUENCES

Based on modeled median surface elevations, baseline conditions will likely result in decreased reservoir water levels and increases in exposed shoreline for both Lake Mead and Lake Powell over the period of analysis. Median elevations under each of the alternatives indicate a similar potential for increased shoreline exposure over time. Tables 3.11-1 and 3.11-2 indicate Lake Mead and Lake Powell median surface elevations identified through modeling (described in Section 3.3), as well as reservoir surface area and exposed shoreline (based on shoreline slope estimates discussed in Section 3.11.2.1) associated with these elevations. The greatest difference in exposed shoreline between baseline conditions and each of the alternatives would generally occur in the first half of the modeled period, as indicated under years 2016 and 2026 in Tables 3.11 and 3.11-2. By year 2036, there are relatively minor variations in exposed

shoreline associated with the median elevations under the alternatives as compared with baseline projections.

Specifically, modeling results indicate an increased potential for fugitive dust emissions under the Basin States, Six States, California and Shortage Protection alternatives when compared with baseline projections throughout the initial, approximately 35 to 40 years of the projections, with the greatest differences in shoreline exposure potential occurring at or near the end of the interim period, in the year 2016. The Flood Control Alternative would have a slightly decreased potential for fugitive dust emission over the entire period of analysis when compared with baseline conditions.

Table 3.11-1
Median Lake Mead Surface Elevation, Surface Area and Exposed Shoreline Area Under Baseline Conditions and Alternative Projections

Scenario	Surface Elevation[1] (feet msl)				Reservoir Surface Area (acres x1000)				Exposed Shoreline Area[2] (acres x1000)			
	2016	2026	2036	2050	2016	2026	2036	2050	2016	2026	2036	2050
Baseline Conditions	1162	1126	1121	1111	120.2	99.8	97.6	93.6	42.3	65.9	68.4	73.0
Basin States Alternative	1143	1125	1120	1111	108.1	99.3	97.4	93.6	56.3	66.4	68.6	73.0
Flood Control Alternative	1162	1128	1119	1111	120.2	100.7	96.8	93.6	42.3	64.8	69.3	73.0
Six States Alternative	1145.5	1124.7	1120.4	1110.6	109.4	99.3	97.5	93.6	54.8	66.4	68.5	73.0
California Alternative	1131.2	1116.4	1117.6	1110.6	102.1	95.9	96.3	93.6	63.2	70.4	69.9	73.0
Shortage Protection Alternative	1130.2	1117.9	1117.6	1110.6	101.7	96.5	96.3	93.6	63.7	69.7	69.9	73.0

[1] Based on modeled median reservoir surface elevations.
[2] Area of exposed shoreline represents the area that would be exposed below the full pool elevation of Lake Mead for the various water surface elevations indicated, assuming an average shoreline slope of 30 degrees. Lake Mead's water surface area is 156,845 acres at water surface elevation of 1219.6 feet msl.

Table 3.11-2
Median Lake Powell Surface Elevation, Surface Area and Exposed Shoreline Area Under Baseline Conditions and Alternative Projections

Scenario	Surface Elevation[1] (feet msl)				Reservoir Surface Area (acres x1000)				Exposed Shoreline Area[2] (acres x1000)			
	2016	2026	2036	2050	2016	2026	2036	2050	2016	2026	2036	2050
Baseline Conditions	3665	3666	3670	3663	134.6	135.2	138.0	132.6	37.0	36.2	32.2	39.9
Basin States Alternative	3664	3666	3670	3663	134.1	135.2	138.0	132.6	37.7	36.2	32.2	39.9
Flood Control Alternative	3665	3666	3670	3665	134.6	135.2	138.0	134.2	37.0	36.2	32.2	37.6
Six States Alternative	3664	3666	3670	3663	134.1	135.2	138.0	132.6	37.7	36.2	32.2	39.9
California Alternative	3660	3661	3670	3663	130.8	131.6	138.0	133.0	42.4	41.3	32.2	39.3
Shortage Protection Alternative	3659	3661	3670	3663	130.2	131.6	138.0	132.6	43.2	41.3	32.2	39.9

[1] Based on modeled median surface elevations.
[2] Area of exposed shoreline represents the area that would be exposed below the full pool elevation of Lake Powell for the various water surface elevations indicated, assuming an average shoreline slope of 45 degrees. Lake Powell's water surface area is 160,782 acres at water surface elevation of 3700 feet msl.

3.12 VISUAL RESOURCES

3.12.1 INTRODUCTION

This visual resource analysis addresses the scenic resources at Lake Mead and Lake Powell. The analysis centers on the potential effects of increased shoreline exposure that could result from implementation of the interim surplus criteria alternatives considered in this document.

3.12.2 METHODOLOGY

The evaluation of the effects of the alternatives on the visual resources is based on an assessment of the changes in reservoir shorelines caused by potential decreases in reservoir water surface elevations. More precisely, the modeling indicates the increased range of water level swings between the highs when reservoirs are full and the lows that could occur when the Colorado River Basin natural runoff is low. The potential water level lows have been described in Section 3.3 in terms of probability of occurrence, based on operation model output. Consequently the visual effects are also presented in terms of the probabilities of shoreline changes. Owing to the subjective nature of visual qualities, this analysis is presented as a qualitative assessment of potential visual effects.

Changes in water elevation have differing effects on the amount of exposed shoreline depending on topography; the analysis relates the changes in lake levels to shoreline topography. The shoreline changes were interpreted from existing topographic maps. The description of the affected environment is derived from NPS documents and commercial maps and literature describing scenery in the LMNRA and the GCNRA.

3.12.3 AFFECTED ENVIRONMENT

Both Lake Mead and Lake Powell are situated in desert areas of the Colorado River Basin. While the desert vistas at the reservoir sites have a certain scenic attractiveness of their own, the reservoirs have added a contrasting visual element that increases the visual attractiveness of the areas, which are now dedicated as national recreation areas. The uniqueness of the reservoirs with their contrasting surroundings has been widely illustrated in travel and vacation literature, and has formed well known visual images which help to draw multi-day visitors seeking water related recreation, and touring motorists making day visits.

The reservoir water levels fluctuate both yearly and, to a lesser degree, seasonally. During high runoff years reservoir inflows exceed the required releases and water is stored, causing the water level to rise. During lower runoff years, when releases are greater than inflows, water levels decline. The effects of water level changes on visual qualities in the GCNRA and LMNRA depend greatly on the distance from which the shoreline is viewed, and the type of topography forming the shoreline.

3.12.3.1 LAKE POWELL

Glen Canyon National Recreation Area is located in the Canyonlands area of the Colorado Plateau. The plateau includes parts of Utah, Colorado, New Mexico, and Arizona and is drained by the Colorado River and its many tributaries. The primary attraction of the GCNRA is Lake Powell, a 186-mile-long reservoir on the Colorado River that is formed by Glen Canyon Dam. Lake Powell extends along what was once the Colorado River, through Glen Canyon and numerous side canyons to form more than 1960 miles of reservoir shoreline. Recreationists enjoy exploring the endless side channels and canyons of the reservoir by boat, often spending several days on the water in houseboats or camping in remote areas. The combined qualities of visual attractiveness and branching waterways create an attraction for many recreationists.

3.12.3.1.1 Landscape Character

In "carving" out the canyon landforms, the Colorado River and its tributaries formed a labyrinthine pattern of deep twisted canyons whose towering walls exhibit the geological history of the region. The sedimentary rock formations show multihued sandstone and limestone layers and change color under differing sun angles occurring during the day. Much of the land surface is bare rock with no soil cover. With little soil cover or moisture, there is minimal vegetation and little relief from the sun and the winds that blow across the vast plateau. Consequently, the terraced plateau landscape above the canyon walls displays the vast expanse of red sandstone and limestone. These red, orange and beige rock formations result in a dramatic landscape of towering rock spires, undulating plateaus of slick rock and steep-sided canyons. Since the filling of Lake Powell several decades ago, a dramatic contrast to this arid red rock environment evolved in the form of the deep blue waters of Lake Powell, with their erratic patterns on the landscape likened to a blue lightening bolt in the red-orange desert. Secluded side canyons support cottonwoods and poplars because of the shelter from the wind provided by the canyon walls, and presence of water from tributaries. Tamarisk, a non-native, invasive species, thrives along the lakeshore and in stream bottoms, wherever it can find abundant water, forming a ring of green vegetation along the less steep slopes of the reservoir. The reservoir and its protected surroundings in the GCNRA form a valued recreation resource.

3.12.3.1.2 Sensitive Viewing Locations

The shoreline of Lake Powell and its adjacent landscape can be viewed from the surrounding land at Glen Canyon Dam and its vicinity and from limited areas of the canyon rim, notably the recreation-oriented area extending upstream of the lake from the west end of the dam.

Access by boat permits the greatest amount and variety of scenic vistas; boaters generally look forward to viewing canyon scenery during their visit to the area. The vistas are relatively short in relation to the surface area of the lake, because of the

sinuous shape of the lake, and the fact that much of the area lies in side canyons and isolated basins along the meandering course of the former Colorado River corridor.

When Lake Powell water level declines, a white band of calcium carbonate appears on rock surfaces where cliffs or rocky slopes form the reservoir rim. In areas where the lakeshore consists of sand and gravel, an exposed beach belt emerges.

3.12.3.2 LAKE MEAD

3.12.3.2.1 Landscape Character

Lake Mead is situated in the northern part of the Mojave Desert and is surrounded by an austere desert landscape. The lake extends about 66 miles upstream from Hoover Dam and has about 695 miles of irregular shorelines with large bays and small coves.

Lake Mead is framed by low mountains with jagged rocky faces and profiles. Intervening canyons and washes provide variation to the terrain, with the combination presenting an interesting rugged type of scenery for many visitors. While the landscape at midday is relatively subdued in terms of color, the contrast with the blue water of the lake provides an appealing scenic area for visitors. Moreover, the contrasting "moods" of the surrounding desert visible between sunrise and sunset create memorable scenic experiences.

3.12.3.2.2 Sensitive Viewing Locations

The portion of the Colorado River corridor where Lake Mead is located consists of alternating narrow rocky canyons and wide alluvial basins. Most of the lake and its shoreline is visible only to people at widely scattered access points and from boats on the lake. The major exceptions are the broad Hemenway Wash area on the west side of the Boulder Basin of the lake, the Las Vegas Bay area on the west side of Boulder Basin and Hoover Dam.

The Hemenway Wash area is a broad colluvial fan extending upslope from the lake to the River Mountains on the west, with one contiguous area named Hemenway Valley extending upslope southward and forming the northern part of Boulder City. At the lake shore, the broad expanse of gradually sloping desert terrain has been developed into a series of water-based recreation areas, consisting of, in a northward direction, Hemenway boat launching area and water craft area (boating area with launching ramps, docks, and shoreline areas designated for personal water craft use), the Boulder Beach area, a largely unimproved gravel beach area for recreation including swimming, windsurfing and sunbathing, with an adjacent overnight campground and a mobile home community, and then the Lake Mead Marina, providing a boat berthing area, restaurant and boat launching and docking facilities.

Westerly of the shoreline area, up the sloping desert terrain, is the boundary between the LMNRA and the beginning of the Hemenway Valley section of Boulder City. This area

has been extensively developed with condominiums and homes ranging in price up to millions of dollars, with much of the area having been developed to take advantage of lake vistas and views of the surrounding hills and desert landforms.

Las Vegas Bay to the north is a relatively narrow area of Lake Mead that is the initial vista presented to people driving to the lake from the Las Vegas Valley. Vistas of the lake are distant because the roads serving the area tend to be on benches above the lake from which direct views of the shoreline are distant and intermittent. Hoover Dam is at the south end of a narrow, steep-walled canyon, which is visible only from the dam and the Arizona abutment and visitor parking areas.

When Lake Mead water level declines, two elements of the area's vista are readily visible. One element is the exposed beach belt around the perimeter of the reservoir where the bottom consists of sand and gravel. The other element is a white band of calcium carbonate on rock surfaces where cliffs or rocky slopes form the reservoir rim.

3.12.4 ENVIRONMENTAL CONSEQUENCES

3.12.4.1 BASELINE CONDITIONS

3.12.4.1.1 Lake Powell

The water surface elevation of Lake Powell under baseline conditions would fluctuate between full level and lower level, with the amount and duration of fluctuation depending on natural runoff in the Colorado River system. Moreover, the potential range of fluctuations would increase with the passage of time as the Upper Divisions states increase their use of river water. An annual fluctuation of approximately 20 feet is projected, in step with the seasonal runoff cycle. Considering the annual fluctuation, the "average full" Lake Powell elevation for this analysis is considered to be an average of approximately 3690 feet msl.

While the timing of major water level variations can not be predicted, nor the length of time the water level would remain at the full level or at any other specific level, the probable range of future baseline water levels has been estimated by the model. As shown on Figure 3.3-6, the median water level decline would be 25 feet below the average full level by the end of 15 years, after which the median level would remain at or above that decline to 2050. There is also a 10 percent probability that the water level would decline as much as 75 feet below the average full level by the end of 15 years, and as much as 135 feet by 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences of such water level declines would affect boaters viewing two types of shoreline. First, colorful sandstone canyon walls could show a white band of

calcium carbonate deposit between the full water level and the lower water level, which would detract from the visual contrast of rock and water. Second, the shoreline areas consisting of sandy or gravelly desertscapes with their unique desert vegetation would be altered by the interposition of a beach belt of sand and gravel between the full water level and the lower water level. This could also alter the contrasting contact between the blue water and the natural desert, and in some cases, distance boaters from the natural terrain.

3.12.4.1.2 Lake Mead

As described in Section 3.3, the water surface elevation of Lake Mead under baseline conditions would fluctuate between a full pool and increasingly lower lake levels, with the amount and duration of fluctuations depending on natural runoff in the Colorado River system. The potential range of fluctuations would increase with the passage of time as the Upper Division states increase their use of river water. While the timing of major water level variations can not be predicted, nor the length of time the water level would remain at the full level or at any other specific level, the probable range of water levels has been estimated by the model. An annual fluctuation of 10 to 20 feet is projected, in step with the seasonal runoff cycle. Considering the annual fluctuation, the "average full" Lake Mead elevation for this analysis is considered to be an average of approximately 1215 feet msl.

As shown on Figure 3.3-13, the median water level would decline 50 feet below the average full level by the end of 15 years, after which the median decline would continue to 105 feet by 2050. There is also a 10 percent probability that the median water level would decline as much as 120 feet below the average full level by the end of 15 years, 180 feet by the end of 30 years, and then continue a gradual decline to 200 feet by 2050. However, as noted above, these lows would be temporary, with the probability that the level of Lake Mead level would fluctuate up to full level when high natural runoff conditions occur.

The visual effect of such a decline perceived by the public would vary depending on the proximity to the reservoir. Persons close to, or on, Lake Mead would perceive that the water level had dropped greatly. However, along most of the alluvial shoreline the exposed bottom would exhibit expanses of gravel. Boaters viewing cliff shorelines would see a band of white calcium carbonate deposits that would probably detract from their appreciation of the rock walls. Persons outside the LMNRA could notice a reduction in reservoir level, depending on their distance from the lake and the degree of visibility of the lake shore. However, beyond the alteration of the water shoreline and the increased prominence of islands and outcrops in the lake, no degradation of the viewshed would be anticipated.

3.12.4.2 BASIN STATES ALTERNATIVE

3.12.4.2.1 Lake Powell

Under this alternative the median water level would decline 25 feet below the average full level by the end of 15 years, after which the median decline would be virtually the same as under baseline conditions to 2050. There is also a 10 percent probability that water level would temporarily decline as much as 85 feet below the average full level by the end of 15 years, and continue a gradual decline to 140 feet by 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.2.2 Lake Mead

Under this alternative the median water level would decline 70 feet below the average full level by the end of 15 years, after which the median decline would reach 105 feet by 2050. There is also a 10 percent probability that water level would temporarily decline as much as 135 feet below the average full level by the end of 15 years, and 205 feet by the end of 30 years and during the remaining period to 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.3 FLOOD CONTROL ALTERNATIVE

3.12.4.3.1 Lake Powell

Under this alternative the Lake Powell water levels would be virtually the same as under baseline conditions. The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.3.2 Lake Mead

Under this alternative Lake Mead water levels would be virtually the same as under baseline conditions. The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.4 SIX STATES ALTERNATIVE

3.12.4.4.1 Lake Powell

Under this alternative the median water level would decline 25 feet below the average full level by the end of 15 years, after which the median decline would be virtually the same as under baseline conditions to 2050. There is also a 10 percent probability that water level would temporarily decline as much as 85 feet below the average full level by the end of 15 years, and continue a gradual decline to 140 feet by 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.4.2 Lake Mead

Under this alternative the median water level would decline 70 feet below the average full level by the end of 15 years, after which the median decline would reach 105 feet by 2050. There is also a 10 percent probability that water level would temporarily decline as much as 130 feet below the average full level by the end of 15 years, and 205 feet by the end of 30 years and during the remaining period to 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.5 CALIFORNIA ALTERNATIVE

3.12.4.5.1 Lake Powell

Under this alternative the median water level would decline 30 feet below the average full level by the end of 15 years, after which the median decline would be virtually the same as under baseline conditions. There is also a 10 percent probability that the water level would decline as much as 95 feet below the average full level by the end of 15 years, and continue a gradual decline to 140 feet by 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.5.2 Lake Mead

Under this alternative the median water level would decline 85 feet below the average full level by the end of 15 years, after which the median decline would reach 105 feet by 2050. There is also a 10 percent probability that water level would temporarily decline as much as 145 feet below the average full level by the end of 15 years, and 210 feet by the end of 30 years and during the remaining period to 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.6 SHORTAGE PROTECTION ALTERNATIVE

3.12.4.6.1 Lake Powell

Under this alternative the median water level would decline 30 feet below the average full level by the end of 15 years, after which the median decline would be virtually the same as under baseline conditions to 2050. There is also a 10 percent probability that the water level would decline as much as 95 feet below the average full level by the end of 15 years, and continue a gradual decline to 140 feet by 2050. However, as noted above, these lows would be temporary lows, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur. The declines cited above represent the average water levels under an annual 20-foot variation.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.12.4.6.2 Lake Mead

Under this alternative the median water level would decline 85 feet below the average full level by the end of 15 years, after which the median decline would reach 105 feet by 2050. There is also a 10 percent probability that the water level would temporarily decline as much as 140 feet below the average full level by the end of 15 years, and 210 feet by the end of 30 years and during the remaining period to 2050. However, as noted above, these lows would be temporary, with a likelihood that the reservoir level would fluctuate up to full level when high natural runoff conditions occur.

The visual consequences would involve the same scenic changes described above for baseline conditions.

3.13 CULTURAL RESOURCES

3.13.1 INTRODUCTION

Cultural resources include prehistoric and historic districts, sites, buildings, structures, objects and landscapes. Historic properties are cultural resources that meet one or more of the Secretary's criteria of significance found at 36 CFR 60.4 and are listed on, or have been found eligible for inclusion, in the National Register of Historic Places (NRHP). The term also includes sites of traditional religious and cultural significance to an Indian Tribe that meet one or more of the NRHP criteria – traditional cultural properties. Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires all federal agencies to take into account the effects of their actions on historic properties.

3.13.2 APPROACH TO ANALYSIS

The first step in the Section 106 process, as set forth at 36 CFR 800.3(a), is for the Agency Official to determine if a proposed action meets the definition of an undertaking. An "undertaking" is defined at 36 CFR 800.16(y) as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; those requiring a federal permit, license or approval; and those subject to State or local regulation administered pursuant to a delegation or approval by a federal agency." The Secretary has the authority to declare surplus conditions with reference to the LROC developed pursuant to the Colorado River Basin Project Act, and to make surplus determinations during the AOP development process. Using the existing LROC and AOP process, the Secretary has declared the existence of surplus conditions every year since 1996 and could continue to do so in the absence of interim criteria. Reclamation has determined development and implementation of interim surplus criteria for use in conjunction with the LROC and AOP process has the potential to temporarily change the way in which surplus is determined for the period 2000-2015. Development and implementation of interim surplus criteria can thus be construed as a temporary change in an ongoing activity that is part of an existing program, the latter being the delivery of Colorado River water. Thus, it meets the definition of an undertaking for the purposes of complying with Section 106 of the NHPA.

The second step in the Section 106 process is to determine if the undertaking has the potential to cause effects to historic properties. If an undertaking "does not have the potential to cause effects on historic properties," pursuant to 36 CFR 800.3(a)(1), the Agency Official has no further obligations under Section 106. *Effect* is defined at 36 CFR 800.16(i) as "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register." Reclamation has determined development of interim surplus criteria is an undertaking, but one without potential to

affect historic properties. Reclamation's rationale for this determination is outlined below.

3.13.3 AFFECTED ENVIRONMENT

The term *area of potential effects* (APE) is defined at 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." This section goes on to state "the area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects cause (*sic*) by the undertaking." For the purposes of evaluating the potential for development and implementation of interim surplus criteria to affect historic properties, the APE has been differentially defined for Lake Powell, Lake Mead, the Grand Canyon, and the reservoirs and river corridor from below Hoover Dam to the SIB. This is to address the effects of changes in lake elevations and mean monthly flow rates predicted by the hydrological modeling runs presented earlier in this EIS, and other factors. The APE definitions used in this analysis are as follows:

Lake Powell: That area around the margin of the lake extending from the historic maximum pool elevation of 3708 feet msl, to the 3595-foot contour. The 3595-foot contour has been selected as the low elevation cutoff point, as hydrological modeling runs indicate there is a 10 percent probability the surface elevation of the lake could drop to this level by 2016 for the Shortage Protection Alternative.

Lake Mead: That area around the lake margin extending from its historic high water level of 1225.5 to 1083 feet msl. The 1083-foot contour has been selected as the low elevation cutoff point as this represents the minimum pool level necessary for continued power generation. The maximum flood pool elevation is 1229 feet msl.

Colorado River through the Grand Canyon: As discussed in Section 1.4.2, the Glen Canyon EIS analyzes the effects of operation of Glen Canyon Dam on downstream resources of the Grand Canyon, including cultural resources. The Record of Decision (ROD) for this EIS provides for monitoring and management of affected cultural resources. Section 106 compliance for existing operations and implementation of surplus criteria are and will be subject to the Cultural Resources Programmatic Agreement prepared with respect to the operation of Glen Canyon Dam. Thus it will not be considered further in this analysis.

Colorado River from Hoover Dam to SIB: Downstream from Hoover Dam, the Colorado River flows through a relatively narrow valley along which are located Lake Mohave and Davis Dam, Lake Havasu and Parker Dam, and a series of smaller dams that serve to impound and divert water for specific purposes. As indicated in Section 3.3.4, although Lake Mohave and Lake Havasu are located within the overall APE of the current action, implementation of interim surplus criteria will have no effect on the surface elevations or operation of these reservoirs. As a consequence, they are not

considered further in this analysis. Below Davis and Parker dams, the river is fringed by riparian vegetation and marshy backwaters, and a series of levees serve to contain its flow. Because under all but the most exceptional circumstances (e.g., a catastrophic flood event, levee failure, etc.), the flow of the Colorado River is expected to be contained within its channel and the levees, and the APE for free-flowing stretches is considered to be the river channel and that area of the floodplain lying within the levees.

3.13.4 ENVIRONMENTAL CONSEQUENCES

The No Action and each of the action alternatives could result in changes in the surface elevations of Lake Powell and Lake Mead and changes in release patterns and flow of the Colorado River below Hoover Dam. These changes could result in changes in erosional and/or depositional processes that could affect historic properties, were such properties present. However, Reclamation considers the probability for the existence of cultural resources retaining qualities that would qualify them for listing on the NRHP within the interim surplus criteria APEs, as defined above, to be extremely low.

Although Hoover and Glen Canyon dams were constructed prior to passage of the NHPA in 1966, attempts were made to locate and salvage information from significant prehistoric and historic archaeological sites prior to inundation by Lake Mead and Lake Powell. As a result of these efforts, numerous kinds of sites including masonry structures, wattle and daub roomblocks, rockshelters, lithic and ceramic scatters, trails, shrines, quarry locations, salt mines, and historic towns, mills, roads, etc., are known to be submerged beneath the waters of the lakes.

Under the baseline condition for the No Action Alternative, impacts that are likely to have occurred to sites inundated by the reservoirs can be expected to vary in kind and degree, depending on a number of factors including the type of site, slope, the substrate on which the site is located, the site's elevation with respect to historic operation of the reservoir, the number of times a site has been inundated, exposed and re-inundated, etc. In areas where the lake margins make contact with unconsolidated sediments (i.e., alluvial fans, fluvial deposits, etc.), wave action and rising and falling water levels can cause cutting and bench formation, exposure and removal of finer-grained sediments, and sorting and redistribution of coarser materials in the sediment matrix along the slope of the bench or beach. If offshore currents are present, materials may be redistributed along the direction of flow. Where lake margins intersect with lenses or large exposures of poorly consolidated bedrock (e.g., carbonate cemented sandstones, formations containing large quantities of gypsum, etc.), rising and falling water coupled with wave action can, over time, result in undercutting and collapse. Lithic artifacts may suffer edge damage or become water-worn, bone items may be splintered or deteriorate completely, and entire classes of cultural materials (i.e., basketry, vegetal food remains, etc.) can be lost as a result of repeated episodes of exposure and inundation.

In general, sites within the range of a reservoir's historic high and low elevations that have been repeatedly inundated and exposed can be expected to have suffered the greatest amount of damage. Since its equalization with Lake Mead in 1974, surface elevations for Lake Powell have fluctuated between 3708 and 3627 feet msl. Sites located between these elevations can thus be expected to have suffered moderate to severe levels of inundation damage and are unlikely to have qualities that would qualify them for consideration as historic properties eligible for potential listing on the NRHP. Modeling runs indicate there is a 10 percent probability the surface level of Lake Powell will drop to 2595 feet msl by 2016. Sites situated between 3627 feet msl and the maximum low of 2595 feet msl predicted by the modeling runs can be expected to have been damaged as the waters of the lake rose, but in the absence of other factors (i.e., strong subsurface currents, landslides, etc.), damage should be less than that anticipated for sites located at higher elevations. Given this, there is a slight possibility sites located between 3627 and 2595 feet might retain some quality that would qualify them for listing on the NRHP.

Lake Mead rose to its historic high elevation of 1225.5 feet msl in 1983 and has dropped to its historic low elevation of 1083 feet on two occasions. The first drop occurred during the period extending from 1954 to 1957, while the second occurred during 1965 and 1966. Sites located between 1225 and 1083 feet msl can be expected to have suffered inundation damage. Damage to all sites is expected to be severe given the 60-plus years the reservoir has been operating, the large annual fluctuation range in reservoir elevation (from 10 to as much as 75 feet prior to the filling of Lake Powell), and the reduction in pool elevation to the historic low on two occasions. Reclamation considers it is highly unlikely sites exist between elevations of 1225 and 1083 feet msl that will retain any qualities that would qualify them for consideration as historic properties eligible for potential listing on the NRHP.

Development and implementation of interim surplus criteria will result in changes in release patterns and mean monthly flow rates along the Colorado River below Hoover Dam. The results of the hydrological modeling runs for all interim surplus criteria alternatives indicate there will be an increase in mean monthly flow rates from Hoover Dam downstream to Parker Dam, while mean monthly flow rates below Parker Dam will decrease.

The Colorado River drains a vast watershed covering portions of seven states. Prior to construction of Hoover Dam, discharge rates along the river varied seasonally, averaging 20,000 cfs with peak flows in excess of 200,000 cfs, making the river extremely dynamic and unpredictable in its behavior. Examination of historic maps during archival work conducted in association with a series of recent cultural resource inventories in the vicinity of Yuma, Arizona (i.e., Bischoff et al., 1998; Huber et al., 1998a, Huber et al., 1998b; Sterner and Bischoff 1998), indicated the Colorado River altered its course several times between the 1840s and the 1950s, in one case meandering two miles across its floodplain. Geomorphological trenching on the floodplain in areas behind the modern levees revealed the presence of sedimentary

deposits characteristic of a high energy fluvial environment. Such deposits are unlikely to contain *in situ* cultural remains. Inventory of several parcels located on the floodplain was also revealing. Only recent trash was found on parcels located inside the levee system, while the earliest cultural materials identified on parcels outside the levees did not pre-date construction of the levee. Prehistoric cultural remains were confined to locations on the first terrace above the 100-year floodplain. The site patterning observed during these studies is doubtless applicable in a general way to other valleys along the reach of the Colorado River below Hoover Dam.

Flow releases associated with development and implementation of interim surplus criteria will be within existing operational limits. Increases in flow rates for the reach of the Colorado River between Hoover and Parker dams and decreases in flow rates below Parker Dam do not have the potential to cause effects to historic properties, as the river in these areas is entrenched and confined in its channel by a system of levees. Furthermore, studies conducted in the vicinity of Yuma, Arizona, suggest that were bank erosion to occur, sediments adjacent to the current river channel would most likely reflect deposition under high-energy fluvial conditions. Sediments deposited under such conditions are unlikely to contain *in situ* cultural remains that would possess qualities that would qualify them for consideration as historic properties potentially eligible for listing on the NRHP.

No surface-disturbing activities will occur as a result of flow releases associated with development and implementation of interim surplus criteria, as such releases will not require construction of new facilities. No modification of existing facilities would be necessary; thus there is no potential for impacts to the structure or functioning of Hoover Dam (a National Historic Landmark), Parker Dam or Imperial Dam (both of which have been determined eligible for listing on the NRHP).

In conclusion, cultural resources that might exist within the APE for Lake Powell and Lake Mead have been repeatedly inundated, exposed, and re-inundated, making it highly unlikely that any retain qualities that would qualify them for consideration as historic properties eligible for listing on the NRHP. Increases and decreases in mean monthly flow rates below Hoover Dam do not have the potential to affect historic properties as flows will be confined to the river channel, which, when not confined by rocky canyon walls, is contained within levees. Were bank erosion to occur, sediments adjacent to the channel are of a type unlikely to contain cultural materials. There is virtually no chance cultural resources retaining qualities that would qualify them for consideration as historic properties potentially eligible for inclusion on the NRHP exist within the APE of the present undertaking. Reclamation thus considers development and implementation of interim surplus criteria to be an undertaking without the potential to affect historic properties. Pursuant to 36 CFR 800.3(a)(1), having determined development and implementation of interim surplus criteria to be an undertaking with no potential to affect historic properties, Reclamation has no further obligations under Section 106 or Part B of 36 CFR 800.

Reclamation has prepared a memorandum discussing this issue and has forwarded it to the Advisory Council on Historic Preservation.

3.14 INDIAN TRUST ASSETS

3.14.1 INTRODUCTION

Indian Trust Assets (ITAs) are legal assets associated with rights or property held in trust by the United States for the benefit of federally recognized Indian Tribes or individuals. The United States, as trustee, is responsible for protecting and maintaining rights reserved by, or granted to, Indian Tribes or individuals by treaties, statutes and executive orders. All Federal bureaus and agencies share a duty to act responsibly to protect and maintain ITAs. Reclamation policy, which satisfies the requirement of Interior's Departmental Manual at 512 DM 2, is to protect ITAs from adverse impacts resulting from its programs and activities whenever possible. Reclamation, in cooperation with Tribe(s) potentially impacted by a given project, must inventory and evaluate assets, and then mitigate, or compensate, for adverse impacts to the asset.

While most ITAs are located on a reservation, they can also be located off-reservation. Examples of ITAs include lands, minerals, water rights and hunting and fishing rights. ITAs include property in which a Tribe has legal interest. For example, tribal entitlements to Colorado River water rights established in each of the Basin States pursuant to water rights settlements are considered trust assets, and the reservations of these Tribes may or may not be located along the river. The present perfected federal reserved rights are rights held directly by the tribal entities for the reservations in whose name the rights are listed in the *Decree*. A tribe may also have other off-reservation interests and concerns that must be taken into account.

Reclamation has entered into government-to-government consultations with potentially affected Tribes to identify and address concerns for ITAs. The Tribes include those in the Ten Tribes Partnership whose landholdings are situated along the Colorado River and various tributaries in the Upper and Lower Basins. Additionally, meetings have been held with the central Arizona Tribes served by CAP facilities, the Coachella Valley Consortium of Mission Indians and other interested Tribes within the Lower Colorado Region. Through meetings and discussions among the Tribes, BIA and Reclamation staff (see Chapter 5), the following sections describe ITAs that have been identified to have the potential to be impacted by interim surplus criteria.

3.14.2 TEN TRIBES PARTNERSHIP

The Tribes comprising the Ten Tribes Partnership are listed below together with the states in which their reservations are located:

Northern Ute Tribe	Utah
Jicarilla Apache Tribe	New Mexico
Navajo Nation	Arizona, New Mexico and Utah
Southern Ute Indian Tribe	Colorado
Ute Mountain Ute Tribe	Colorado and New Mexico
Fort Mojave Indian Tribe	Arizona, Nevada and California
Chemehuevi Tribe	California
Colorado River Indian Tribes	Arizona and California
Quechan Indian Tribe	Arizona and California
Cocopah Indian Tribe	Arizona

The CRSS demand database used for the model analysis in this FEIS includes discrete representation of the Ten Tribes' demand schedules through "demand nodes" in the model. The Tribal demands and their respective points of diversion were obtained from the Tribes in the summer of 2000. The schedules and the full quantified entitlements on which they are based are shown in Attachment Q. The following discussion describes the Ten Tribes' water rights by Tribe.

3.14.2.1 NORTHERN UTE INDIAN TRIBE – UINTAH AND OURAY RESERVATION

The Northern Ute Tribe is located in northeastern Utah in the Green River watershed. Quantification of the Tribe's water rights began in 1923 with two federal court Decrees that quantified the water rights for the Uintah Indian Irrigation Project (UIIP). A 1960 report, commonly referred to as the "Decker Report," divided lands on the reservation into seven groups. Those land groups have served as the basis for discussions of settlement of the Tribe's water right claims over the subsequent 40 years. Congress ratified a 1990 tabulation of the Tribe's water rights in 1992 subject to re-ratification by the Tribe and State of Utah. That tabulation utilizes the Decker Report's land groups as follows:

1. UIIP lands with water rights decreed by the federal court in 1923, and certified by the State of Utah on the Lakefork, Yellowstone, Uinta and Whiterock rivers. Priority date - October 3, 1861.

2. UIIP lands with water rights certificated by the State of Utah served from the Duchesne River including the towns of Duchesne, Randlett and Myton. Priority date October 3, 1861.

3. Lands that are or can be served from the Duchesne River through UIIP which are not certificated by the state. Priority date would be October 3, 1861.

4. Lands found to be productive and economically feasible to be irrigated from privately constructed ditch systems on the Duchesne River or its tributaries above Pahcease Canal. Priority date would be October 3, 1861.

5. Lands susceptible to irrigation and proposed to be developed within the Central Utah Project. Priority date would be October 3, 1861.

6. Lands east of the Green River served from the White River for which Applications to Appropriate Water were once filed with the State of Utah.

7. Lands east of the Green River found to be productive and economically feasible to be irrigated from privately constructed ditch systems now in operation or to be constructed along the Green River, White River, Willow Creek, Bitter Creek, Sweet Water Creek and Hill Creek.

Tables quantifying the Tribe's diversion and depletion rights as tabulated in the 1990 Tabulation (but not yet ratified by the Tribe or state) are included in the Ten Tribes Depletion Schedule (Attachment Q). The diversion rights total approximately 480,000 af with depletions of 248,943 af. The water rights appurtenant to the Group 5 Duchesne Basin lands are proposed to be transferred to the Green River with a seven percent reduction explaining the difference in the table totals. Current water diversions by the Northern Ute Tribe are approximately 250,000 afy for irrigation applications and a small amount of M&I use for oil and gas and a small culinary water system.

The Northern Ute Tribe has five demand points modeled in the CRSS: two demand points on the Green River, two demand points on the Duchesne River and one point on the White River.

3.14.2.2 JICARILLA APACHE INDIAN RESERVATION

The Jicarilla Apache Indian Reservation is located in the upper reaches of the San Juan River Basin and the Rio Chama Basin in northwestern New Mexico. The reservation straddles the Continental Divide.

Pursuant to the Jicarilla Apache Tribe Water Rights Settlement Act ("Settlement Act"), the Tribe is authorized to divert 40,000 afy from the San Juan River Basin, 32,000 afy of which may be depleted. The Settlement Act provides the Tribe the right to divert 33,500 afy or deplete 25,500 afy from either the Navajo Reservoir supply or directly from the Navajo River as it crosses the Jicarilla Apache Indian Reservation. The Settlement Act also authorizes the Tribe to divert and deplete 6,500 afy from the San Juan River Basin through the transmountain San Juan-Chama Project. The Jicarilla Apache Tribe agreed to subordinate its 1880 priority date for the 40,000 afy (diversion) of "future use" federal reserved water rights in exchange for the 1955 priority date associated with the two federal projects. The Tribe's agreement to subordinate its 1880 priority date for the 1955 date is discussed in a settlement contract between the Jicarilla Apache Tribe and the Secretary. The settlement contract is ratified by the Settlement Act. These are fully adjudicated rights, which, by virtue of the Settlement Act, the Tribe may market to the full extent that the law allows. The Tribe's long-term plans for this water include both off-reservation leasing and on-reservation development.

In addition to these "future use" water rights adjudicated in accordance with the Settlement Act, the Jicarilla Apache Tribe also has adjudicated rights to divert 5,683.92 afy or to deplete 2,195 afy, whichever is less, for historic and existing water uses. Thus, the Jicarilla Apache Tribe's total water diversion rights from the San Juan River Basin amount to 45,683 afy and the Tribe's overall depletion rights from the San Juan Basin total 34,195 afy.

In the CRSS model, the Jicarilla Apache Tribe is represented by four demand points: There is a single node on the upper San Juan River for the current on-reservation uses of the Tribe and those Reclamation assumed were planned for the future. The Tribe's portion of the San Juan – Chama export diversion is in an existing demand point and does not need to be separated. During 2000, the Jicarilla Apache Tribe anticipates entering into a lease of 16,200 afy through 2025 to Public Service Company of New Mexico for depletion at the San Juan Generating Station. In addition, the Tribe anticipates entering into other short-term off-reservation water leases, ultimately preserving some off-reservation leases in 2060 while allowing the Tribe to use the majority of its San Juan River Basin depletions on-reservation. In order to show the change in water leases, a new demand point has been added to show the Jicarilla water going to the power station and future changes in deliveries. The Tribe is investigating the feasibility of leasing 7,500 afy of water to the City of Gallup via the Gallup-Navajo Municipal Water Supply Project. The Jicarilla lease portion of the project is a new demand point in the CRSS model.

3.14.2.3 NAVAJO INDIAN RESERVATION

The Navajo Nation is located in northeastern Arizona, southeastern Utah and northwestern New Mexico. Navajo reserved water rights to the mainstream Colorado River, the Little Colorado River and the San Juan River basins are not adjudicated. The Navajo Indian Irrigation Project was authorized by P.L. 87-483. When authorized, the project was envisioned as a gravity irrigated system with an average annual diversion of 508,000 afy, and a resulting depletion of 254,000 afy. Since authorization in 1962, the project has been re-designed as a pressurized sprinkler system with an anticipated average annual diversion of 337,500 afy, and a resulting depletion of 270,500 afy. The priority date for this diversion and depletion is not later than October 16, 1957.

The CRSS model includes six demand points for the Navajo Nation. There is a demand point for NIIP on the San Juan River upper reach. Current use and development data listed for the NIIP demand point are from the development schedule in the NIIP Biological Assessment dated June 11, 1999. The Navajo Nation also has a small share in the Animas-La Plata Project (ALP) of 4,680 af of withdrawal and 2,340 af of depletion annually. This future withdrawal and use has been accounted for in the CRSS model by splitting the existing ALP M&I node for New Mexico uses and adding a separate point on the Upper San Juan Reach for the Tribe's ALP water.

Present uses in the San Juan River Basin for project areas other than the NIIP have been quantified in the hydrology models of the basin in the formulation of the Animas-La Plata Project Draft EIS. CRSS demand points exist for the future Gallup-Navajo Project showing 5,000 acre-feet of depletion in Arizona and 17,500 acre-feet of depletion in New Mexico. The existing point was updated to include the Cudei Irrigation Project with the Hogback node, as these projects will soon be combined into a single diversion. A demand point was added to the CRSS to include the existing Fruitland, New Mexico project in the model. Other minor uses on the Navajo Reservation have been included in natural flow calculations and are not included as consumptive demands in the CRSS model.

The Navajo Nation currently operates a marina at Antelope Point on Lake Powell. The boat ramp is not operational when the lake level is below elevation 3,677 feet msl. See Section 3.9.2.3.1, Lake Powell, regarding impacts to Lake Powell elevations.

3.14.2.4 SOUTHERN UTE RESERVATION

The Southern Ute Indian Tribe is located in southwestern Colorado just west of Navajo Reservoir. The Tribe has settled its water rights pursuant to agreement with the State of Colorado and pursuant to 1988 federal legislation effective December 19, 1991. The settlement requires the construction of the Animas-La Plata Project. The Tribe has the right to reopen the adjudication of their water rights on the Animas and La Plata Rivers if certain agreed upon dates are not met regarding project implementation. The agreement provides the Tribe with a variety of direct flow rights with priorities ranging from 1868 to 1976 in streams and rivers passing through the Southern Ute Reservation.

The CRSS model has two demand points for the Southern Ute Tribe. In the model, the Present Level - Colorado Agriculture demand point on the San Juan River has been split to separate Southern Ute Tribal uses from non-reservation uses.

The Tribe also has a right to 39,525 acre-feet of water with 19,762 acre-feet of depletion from the future ALP with a project priority of not later than 1966 for M&I use. To account for the Southern Ute portion of the water use, the demand point in Colorado was split into three to separate Southern Ute, other tribes and non-tribal uses.

3.14.2.5 UTE MOUNTAIN UTE INDIAN RESERVATION

The Ute Mountain Ute Tribe is located in the southwestern corner of Colorado with a small part in northwestern New Mexico. The Tribe has settled its water rights pursuant to agreement with the State of Colorado and pursuant to 1988 federal legislation effective December 19, 1991. The settlement requires the construction of the Animas-La Plata Project. If it should prove impossible to construct this project, the Tribe has the right to reopen the adjudication of their water rights on the Animas and La Plata Rivers. The agreement provides the Tribe with a variety of direct flow rights with priorities

ranging from 1868 to 1985 in three streams, the Mancos River, San Juan River and Navajo Wash, which pass through the Ute Mountain Ute Reservation.

The CRSS model has four demand points for the Ute Mountain Ute Tribe. In the model the Present Level - Colorado Agriculture demand point on the Lower San Juan River was split in two to separate Ute Tribal uses.

The Tribe also possesses 25,180 acre-feet of storage with 19,260 acre-feet of depletion per year from the Dolores Project for agricultural and other uses with a project priority of not later than 1963. The Dolores Project is accounted for in the CRSS model at two points, one of which is for the Ute Mountain Tribal water use.

The Ute Mountain Ute Reservation will have a share of the water in the future ALP. The Tribe will receive 39,525 af of withdrawal and 19,762 af of depletion rights from the ALP as it is now formulated. This water is intended for M&I use on the reservation. To account for the Ute Mountain Ute portion of the water use, the demand point in Colorado was split into three separate parts: Ute Mountain Ute Tribe, other Tribes and non-Tribal uses.

3.14.2.6 FORT MOJAVE INDIAN RESERVATION

The Fort Mojave Indian Reservation is located in the Lower Colorado River Basin where Nevada, Arizona and California meet. The Tribe possesses present perfected federal reserved water rights from the main stem of the Colorado River in all three of the states that contain reservation land, pursuant to the Decree in *Arizona v. California* and supplemental Decrees (1979 and 1984). Since the original Decree was entered, 1,102 acres of land have been added to the reservation along with rights to 6.464 acre-feet per acre of water as specified in the 1979 Decree. The amounts, including added lands, priority dates, and state where the water rights are perfected, are as follows:

Amount (afy)	Acreage	Priority Date	State
27,969	4,327	September 18, 1890	Arizona
75,566	11,691	February 2, 1911	Arizona
103,535	16,018		Arizona subtotal
13,698	2,119	September 18, 1890	California
12,534	1,939	September 18, 1890	Nevada
129,767	**20,076**		**Total**

The Fort Mojave Indian Tribe has exercised its water rights in California in excess of the amounts currently decreed. In it's June 19, 2000 Opinion, the United States

Supreme Court accepted the Special Master's uncontested recommendation and approved the proposed settlement of the dispute respecting the Fort Mojave Indian Reservation. Under the settlement, the Tribe is awarded the lesser of an additional 3,022 af of water or enough water to supply the needs of 468 acres.

The attached tables are estimates of use based upon calculations derived from records of electrical consumption at the various pump stations and are not from measured flows. The CRSS model contains four demand sub points for the Tribe's water diversions, which are divided among three states. The points are on the Lake Mohave reach of the model, and are further divided into sub points by state. A separate sub point is included for Reservation Land development, but has a diversion of zero af at this time. Current depletion amounts for the CRSS model nodes have been updated to reflect the most recent consumptive use numbers provided by the Lower Colorado River Accounting System (LCRAS) report for calendar year 1998. Future depletions at full development are calculated as the greater of 70 percent of diversion rights and the per acre rate of consumptive use from the LCRAS report multiplied by the full right acreage of the Tribe.

3.14.2.7 CHEMEHUEVI INDIAN RESERVATION

The Chemehuevi Indian Reservation is located in southern California near Lake Havasu. The Tribe possesses present perfected federal reserved water rights from the main stem of the Colorado River pursuant to the Decree in *Arizona v. California* and supplemental Decrees (1979 and 1984). The amounts, priority dates, and state where the rights are perfected, are as follows:

Amount (afy)	Acreage	Priority Date	State
11,340	1900	February 2, 1907	California

The lands of the Chemehuevi Tribe are mostly on the plateau above the shoreline of Lake Havasu. Present agricultural water use is limited. Currently, the CRSS model includes a demand point for the Chemehuevi Reservation on the Lake Havasu reach of the model. Current depletion amounts for the CRSS model nodes have been updated to reflect the most recent consumptive use numbers provided by the LCRAS report for calendar year 1998. Future depletions at full development are calculated as the greater of 70 percent of diversion rights and the per acre rate of consumptive use from the LCRAS report multiplied by the full right acreage of the Tribe.

3.14.2.8 COLORADO RIVER INDIAN RESERVATION

The Colorado River Indian Reservation is located in southwestern Arizona and southern California south of Parker, Arizona. The Tribes possess present perfected federal reserved water rights from the main stem of the Colorado River pursuant to the Decree

in *Arizona v. California* and supplemental Decrees (1979 and 1984). The amounts, priority dates, and state where the rights are perfected, are as follows:

Amount (afy)	Acreage	Priority Date	State
358,400	53,768	March 3, 1865	Arizona
252,016	37,808	November 22, 1873	Arizona
51,986	7,799	November 16, 1874	Arizona
662,402	99,375		Arizona subtotal
10,745	1,612	November 22, 1873	California
40,241	6,037	November 16, 1874	California
3,760	564	May 15, 1876	California
54,746	8,213		California subtotal
717,148	**107,588**		**Total**

The CRSS Model presently has three demand sub-nodes listed for the Colorado River Tribe on the reach above Imperial Dam number. The water diversions are split between sub-points for California demands, Arizona demands and a separate sub-node for future pumped diversions in Arizona. Current depletion amounts for the CRSS model nodes have been updated to reflect the most recent consumptive use numbers provided by the LCRAS report for calendar year 1998. Future depletions at full development are calculated as the greater of 70 percent of diversion rights and the per acre rate of consumptive use from the LCRAS report multiplied by the full right acreage of the Tribe.

3.14.2.9 QUECHAN INDIAN RESERVATION (FORT YUMA)

The Fort Yuma Indian Reservation (Quechan Tribe) is located in southwestern Arizona and southern California near Yuma, Arizona. The Tribe possesses present perfected federal reserved water rights from the main stem of the Colorado River pursuant to the Decree in *Arizona v. California* and supplemental Decrees (1979 and 1984). The amounts, priority dates and state where the rights are perfected, are as follows:

Amount (afy)	Acreage	Priority Date	State
51,616	7,743	January 9, 1884	California

A recent Supreme Court decision issued on June 19, 2000 allows the Tribe to proceed with litigation to claim rights to an additional 9,000 acres of irrigable lands. Proving this claim would increase the water rights for the reservation.

Water for the Quechan Tribe is diverted from the Colorado River at Imperial Dam and delivered through the Yuma Project Reservation Division-Indian Unit. The Tribe has other small uses at homestead sites south of Yuma, Arizona. The current water uses shown in the following tables include only Quechan Indian Tribe uses within the Fort Yuma Reservation. These uses are accounted for in the CRSS model with one diversion point on the Imperial Dam Diversions reach. The current withdrawal and depletion values have been updated to reflect the most recent consumptive use numbers provided by the LCRAS report for calendar year 1998. Future depletions at full development are calculated as the greater of 70 percent of diversion rights and the per acre rate of consumptive use from the LCRAS report multiplied by the full right acreage of the Tribe.

3.14.2.10 COCOPAH INDIAN TRIBE

The Cocopah Indian Reservation is located in southwestern Arizona near Yuma, Arizona. The Tribe possesses present perfected federal reserved water rights from the main stem of the Colorado River pursuant to the Decree in *Arizona v. California* and supplemental Decrees (1979 and 1984). The amounts, priority dates, and state where the rights are perfected, are as follows:

Amount (afy)	Acreage	Priority Date	State
7,681	1,206	September 27, 1917	Arizona
2,026	318	June 24, 1974	Arizona
1,140	190	1915	Arizona
10,847	**1,714**		**Total**

The rights listed above and in the attached tables include only that water diverted directly from the Colorado River at Imperial Dam. In addition to these rights, the Tribe has numerous well permits that divert groundwater that may be connected to the Colorado River within the boundaries of the United States (studies are ongoing).

The 1974 present perfected federal reserved right for the Cocopah Indian Reservation is unique because of its more recent priority date. The 1979 supplemental Decree in *Arizona v. California* specifies that in the event of a determination of insufficient mainstream water to satisfy present perfected rights pursuant to Article II (B) (3) of the 1964 Decree, the present perfected rights set forth in paragraphs (1) through (5) of Article II (D) of the Decree must be satisfied first. The 1984 supplemental Decree in *Arizona v. California* recognized the present perfected federal reserved right for the

Cocopah Indian Reservation dated June 24, 1974, and amended paragraph (5) of Article II (D) of the Decree to reflect this 1974 right.

The Tribe is involved in litigation to claim rights to a total of 2,400 acres of irrigable lands. Proving this claim would further increase the water rights for the reservation.

Water diversions for the Cocopah Indian Tribe are listed at two demand nodes in the CRSS model on two of the model reaches. A demand point on the Imperial Dam diversion reach accounts for all of the Tribe's rights and current uses in Arizona. Another node is provided for future pumped diversions below Imperial Dam, but it has a diversion of zero af at the current time. Current depletion amounts for the CRSS model nodes have been updated to reflect the most recent consumptive use numbers provided by the LCRAS report for calendar year 1998. Future depletions at full development are assumed to be 100 percent of the diversions as the location of the reservation prevents a return flow within Arizona.

3.14.2.11 Environmental Consequences

The Ten Tribes have a significant amount of undeveloped water rights. The current availability of surplus water on the Colorado River is primarily a direct result of unused existing entitlements, including those of the Tribes. The Ten Tribes have raised significant concerns that interim surplus criteria could: 1) foster a reliance on surplus water on the part of other entitlement holders; 2) provide a disincentive for those entitlement holders to support future Tribal development; and 3) have the practical effect of diminishing the Tribes' ability to utilize their entitlements.

The interim surplus criteria will not alter the quantity or priority of tribal entitlements. In fact, as noted by the description of the Ten Tribes' water rights above, the Tribes have the highest priority water rights on the Colorado River. Surplus determinations have been made since 1996. The interim surplus criteria would not make any additional surplus water available as compared with current conditions, but rather would provide more objective criteria for surplus determinations. Moreover, the preferred alternative would quantify the amounts of surplus water to be made available. Reclamation does not believe that identifying the limited amounts of surplus water will provide any additional disincentives for Tribal water development. Interim surplus criteria are intended to assist in the effort to reduce the overreliance by California on surplus water. The selection of any of the alternatives of this proposed action does not preclude any entitlement holder from using its water.

3.14.2.11.1 Upper Basin Mainstem Tribes

As expected, the model analyses showed that interim surplus criteria would have no effect on Upper Basin deliveries, including the Tribal demands above Lake Powell. As noted in Section 3.4.4.4, the normal delivery schedules of all Upper Basin diversions would be met under most water supply conditions. Only under periods of low

hydrologic conditions would an Upper Basin diversion be shorted. Although the model is not presently configured to track the relative priorities under those conditions, such effects are identical under baseline and all alternatives.

3.14.2.11.2 Lower Basin Mainstem Tribes

Under normal conditions, deliveries to Lower Basin users are always equal to the normal depletion schedules, including those for the Tribes. Under shortage conditions, only CAP and SNWA share in the shortage until CAP goes to zero (which was not observed in any of the modeling runs done for this EIS). Therefore, the Tribes of the Ten Tribe Partnership in the Lower Basin would receive their scheduled depletion, with the exception of the Cocopah Tribe that has some Arizona Priority 4 water. However, adoption of the interim surplus criteria would not significantly increase the risk of shortages to holders of Arizona Priority 4 water. For example, the modeling analysis indicates that under the preferred alternative, the occurrence of Priority 4 shortages would be approximately four percent greater than under baseline conditions.

3.14.3 TRIBES SERVED BY CENTRAL ARIZONA PROJECT

Various Indian tribes and communities in central Arizona have been provided water pursuant to CAP contracts by either direct Secretarial actions or through negotiated water rights settlements (CAP Tribes). CAP water has played a primary role in facilitating water rights settlements in Arizona; it is expected to play such a role in the future. In fulfillment of the trust responsibility, the impact of shortages upon the water supplies provided to the CAP Tribes is a primary concern.

The Tribes that receive CAP water are listed below together with the counties in which their reservations are located:

Gila River Indian Community	Maricopa and Pinal
San Carlos Indian Tribe	Gila, Pinal and Graham
Tohono O'Odham Nation	Pina, Maricopa and Pinal
Tonto Apache Tribe	Gila
Yavapai-Apache Indian Community	Yavapai
Fort McDowell Indian Community	Maricopa
Salt River Pima Maricopa Indian Community	Maricopa
Ak Chin Indian Community	Pinal
Pascua-Yaqui Tribe	Pima
Yavapai-Prescott Indian Tribe	Yavapai

3.14.3.1 WATER RIGHTS SETTING

3.14.3.1.1 CAP Priority Scheme

An understanding of the CAP priority scheme is vital in order to understand how shortages could potentially impact the different priorities of CAP water and CAP water

users, including Indians. Traditionally, Reclamation's view is that the CAP has five priorities of water rights. The first priority is known as Colorado River water. Colorado River water was secured by the United States for settlement of certain Indian water claims. The second priority includes M&I water and Indian Homeland water. The third priority is Indian agricultural water that was allocated to tribes by the Secretary but was not classed as Homeland water. The fourth priority is M&I water above the first 510,000 af of the M&I allocation (equal to 128,823 af).

The fifth priority is non-Indian agricultural water. The fifth priority is available to several users besides non-Indian agriculture. For example, 312,898 af of fifth priority CAP water, called Excess water, is available to the Central Arizona Groundwater Recharge District (CAGRD) for groundwater recharge, non-Indian agriculture, and the Arizona Water Banking Authority (AWBA) for in-lieu recharge and direct groundwater recharge. The remaining portion of fifth priority CAP water, 51,800 af, is non-Indian agricultural water that is assumed to be allocated to Indian users.

The priorities discussed in this section are internal to the CAP and must not be confused with priorities of water entitlements along the mainstream of the Colorado River.

The future allocation of CAP water to some CAP priorities is not definitive because of the dual possibility of finalizing or not finalizing two settlements. One settlement is among the Gila River Indian Community (GRIC), certain Arizona entities and the United States (GRIC Settlement). The second settlement is the CAP Settlement between the United States and the Central Arizona Water Conservation District (CAWCD). Under shortage, potential impacts to Indian CAP water users differ depending upon whether CAP water is allocated under settlement or without settlement.

Table 3.14-1 provides, in units of afy, allocations of CAP water to CAP priorities for certain Indian Tribes or communities under two scenarios. The first scenario, Likely Future Without, reflects assignment of water rights absent final GRIC and CAP settlements. The second scenario, With Settlement, assumes final GRIC and CAP settlements. The primary difference between the two scenarios is that with final settlements, GRIC is assigned an additional 102,000 af of non-Indian agricultural water and the United States reserves 69,800 af of other non-Indian water for future water rights settlements.

Table 3.14-2 reflects the CAP priority scheme under the two scenarios and identifies the points at which shortages on the Colorado River begin to impact different priorities of CAP water. Normal year diversions of CAP water are assumed to be 1.5 maf. Reductions for system losses result in deliverable water of 1,415,000 af. The effects of shortages on CAP water associated with various priorities is as follows:

> *Fifth Priority*. In the event of a shortage on the river restricting deliveries of CAP water to 925,000 af, the fifth priority water rights would go unfulfilled.

Table 3.14-1
Central Arizona Project Indian Water Allocations
Unit: Acre-Feet Annually

Indian Tribe and Allocation	Likely Future without GRIC (afy)	With GRIC Settlement (afy)
Gila River Indian Community		
Indian Allocation	173,100	173,100
Indian Priority – HVID	17,800	17,800
Settlement Water		
M & I – ASARCO	17,000	17,000
Non-Indian Agric.-RWCD	18,600	18,600
Other		102,000
Total	226,500	328,500
San Carlos Indian Tribe		
Indian Allocation	12,700	12,700
M & I Priority	18,145	18,145
Indian Reallocation (Ak Chin)(minus losses)	30,800	30,800
Total	61,645	61,645
Tohono O'Odham Nation (San Xavier, Schuk Toak, Chui-Chu)		
Indian Allocation	45,800	45,800
Non-Indian Agric.	28,200	28,200
Total	74,000	74,000
Tonto Apache Tribe		
Indian Allocation	128	128
Total	128	128
Yavapai-Apache Indian Community		
Indian Allocation	1,200	1,200
Total	1,200	1,200
Fort McDowell Indian Community		
Indian Allocation	4,300	4,300
Indian Priority-HVID	13,933	13,933
Total	18,233	18,233
Salt River Pima Maricopa Indian Community		
Indian Allocation	13,300	13,300
Colorado River (net of losses)	20,900	20,900
Non-Indian Agric.	5,000	5,000
Total	39,200	39,200
Ak Chin Indian Community		
Indian Allocation	25,000	25,000
Colorado River	50,000	50,000
Total	75,000	75,000
Pascua Yaqui Tribe		
Indian Allocation	500	500
Total	500	500
Yavapai-Prescott Indian Tribe (assigned to Scottsdale)		
Indian Allocation	500	500
Total	500	500
Total Indian Allocations		
Indian Allocation	309,828	309,828
Homeland	54,428	54,428
Agricultural	255,400	255,400
Colorado River	70,900	70,900
Indian Priority-HVID	31,733	31,733
M & I Priority	35,145	35,145
Non-Indian Agric.	51,800	153,800
Unassigned HVID	1,518	1,518
Future Settlements (agric. priority)		69,800
Total	498,424	670,224
Municipal and Industrial Water Supply	603,678	603,678
Non-Indian Agricultural Water Supply	312,898	141,098
Total Normal Water Supply	1,415,000	1,415,000

Source: Central Arizona Project 1996 Water Supply Study for Stage II Cost Allocation
Draft EIS for allocation of CAP water supply -- June, 2000

Fourth Priority. Subsequent reductions would impact M&I water amounts in excess of 510,000 af. Consequently, any M&I priority water which has been reallocated for Indian use would also be affected.

Third Priority. The next block of water to be impacted by shortages is a portion of the Indian agricultural water. The deliveries to GRIC would be reduced by 25 percent of its agricultural allocation; all other tribes having Indian agricultural water would be reduced by 10 percent of their respective agricultural allocations.

Second Priority. The remaining M&I and Indian priority water would be reduced on a pro rata basis as water deliveries decrease.

First Priority. Colorado River water would be unavailable only if a shortage were severe enough that no diversion could be made into central Arizona.

3.14.3.1.2 Examples of Reductions of CAP Water Deliveries

Table 3.14-3 demonstrates the incidence of reductions to the CAP Indian supplies during shortage on the Colorado River under the Likely Future Without scenario. Various quantities of CAP water deliveries have been assumed in order to show the varying impacts between Indian tribes. The amount of CAP water that represents a division between one priority and the next higher priority is referred to here as a "break point." For example, the estimated break point between the fifth and fourth priorities is 1,050,302 af. A total available CAP water supply of 1,050,302 af means that no deliveries of fifth priority CAP water would be made. If the shortage decreases the available total CAP water supply below 1,050,302 af, deliveries of fourth priority CAP water would be impacted. Similarly, between the fourth and third priorities, the break point is 921,479 af. The division between the third and second priority is 869,974 af. Finally, the last break point is 68,400 af. See Section 3.4.4.1.2 for a summary of the Arizona modeled annual depletions under normal, surplus and shortage conditions.

Reductions in Indian water supplies in the fifth priority are estimated to be 51,800 af. The affected amount of Indian water supply in the fourth priority is 7,087 af. The third priority Indian agricultural water affected totals 51,505 af. Indian priority water in the second priority totals 317,132 af. Finally, the Colorado River priority water held by Indians totals 68,400 af.

Table 3.14-4 shows the same information as Table 3.14-3, but assumes a final GRIC and CAP settlement. The same priority scheme is applied as used in the without settlement scenario. In this instance, GRIC is allocated an additional 102,000 af of non-Indian agricultural water. The amount of 69,800 af of non-Indian agricultural water is held by the United States for future Indian water rights settlements. As a result, the potential Indian/federal loss in the fifth priority increases to 223,600 af, as compared with 51,800 af without settlement. Impacts to the other priorities remain the same.

Table 3.14-2
Traditional Reclamation Priorities for Central Arizona Project Water[7]
Acre-Feet Per Year

		Likely Future without GRIC	Total Water	With GRIC Settlement	Total Water
First:	Colorado River Water – Yuma Mesa and Wellton Mohawk	68,400	68,400[1]	68,400[1]	68,400
Second:	Pro rata reduction of Indian and M & I water	801,574	869,974[2]	801,574	869,974
Third:	Indian agricultural water (reduce 25 % of GRIC ag. water, and 10 % of other Indian ag.) (Indian agric. water is that portion of original allocation which is not "Homeland")	51,505	921,479[3]	51,505	921,479
Fourth:	M & I water above 510,000 acre feet, including M&I reallocations to Indians	128,823	1,050,302[4]	128,823	1,050,302
Fifth:	Non-Indian agricultural water reallocated to Indians	51,800	1,102,102[5]	223,600	1,273,902
Fifth:	Excess water (priority = 1, CAGRD 2, Agric., 3 AWBA)	312,898	1,415,000[6]	141,098	1,415,000

Notes:
[1] The total represents the Yuma Mesa water (50,000 af) plus Wellton-Mohawk water (22,000 af) minus estimated transmission losses.
[2] Total is composed of 510,000 af of M&I water plus 33,251 af of HVID water plus 258,323 af of Indian water after reductions in third priority and losses
[3] Amount is made up of 43,275 af of GRIC water and 8,230 af of other Indian agricultural water
[4] Amount is the difference between 638,823 af and 510,000 af of M&I priority water
[5] Likely Future" amount is 51,800 af of reallocated agricultural water
GRIC Settlement" amount is the sum of 153,800 af of reallocated agricultural water and 69,800 af of reallocated agricultural water held by U. S. for future Indian water settlements
[6] The amount is an estimate of the excess water pool, with and without settlement between the U.S. and CAWCD
[7] The traditional USBR interpretation of shortage sharing criteria is used in the analysis of the likely future with and without the GRIC settlement. It is understood that new shortage sharing criteria are included in the GRIC settlement but the settlement is under negotiation at the current time. Reclamation believes that the use of the traditional shortage sharing criteria for likely future with GRIC settlement will not have a major effect on the relative difference among the alternatives.

Table 3.14-3
Reductions in Indian CAP Water Supplies During Times of Shortage on Colorado River
Likely Future Without GRIC Settlement

	CAP Water Supply	Reduction	GRIC	San Carlos	Tohono O'Odham	Tonto Apache	Yavapai Apache	FMIC	SRPMIC	Ak Chin	Pascua Yaqui	Yavapai Prescott	Total Unassigned HVID	Accumulated Reductions per Priority	Reductions
Fifth Priority	1,415,000		none	none	none	none	none	none	none	none	none	none			
		115,000													
	1,300,000		5,865		8,892				1,577					16,334	
Agricultural		215,000													
	1,200,000		10,965		16,625				2,948					30,538	
		315,000													
	1,100,000		16,065		24,357				4,319					44,741	
		364,698													
	1,050,302		18,600		28,200				5,000					51,800	51,800
		50,302													
Fourth Priority	1,000,000		1,339	1,429										2,767	
		125,302													
	925,000		3,334	3,559										6,894	
M & I		128,823													
	921,479		3,428	3,659										7,087	58,887
		21,479													
Third Priority	900,000		18,047	1,501	334				555	1,043				21,479	
		51,505													
Indian Ag.	869,974		43,275	3,600	800				1,330	2,500				51,505	110,392
		69,974													
Second Priority	800,000		14,072	4,748	3,928	41	105	1,592	1,045	1,964	44	44	133	27,684	
		169,974													
	700,000		34,182	11,533	9,542	27	252	3,866	2,538	4,771	106	106	322	67,248	
M & I		269,974													
and	600,000		54,282	18,317	15,156	43	404	6,141	4,032	7,578	168	168	511	106,812	
Indian		369,974													
	500,000		74,402	25,102	20,770	59	554	8,416	5,525	10,385	231	231	701	146,375	
		469,974													
	400,000		94,512	31,887	26,384	75	704	10,690	7,018	13,192	293	293	890	185,939	
		569,974													
	300,000		114,622	38,672	31,998	91	853	12,965	8,511	15,999	356	356	1,079	225,502	
		669,974													
	200,000		134,732	45,457	37,612	107	1,003	15,240	10,005	18,806	418	418	1,269	265,066	
		769,974													
	100,000		154,842	52,242	43,226	123	1,153	17,514	11,498	21,613	480	480	1,458	304,630	
		799,074													
	68,400		161,197	54,386	45,000	128	1,200	18,233	11,970	22,500	500	500	1,518	317,132	427,524
First Priority		70,900													
	0								20,900	47,500				68,400	
Colo. River															
Total Reductions			226,500	61,645	74,000	128	1,200	18,233	39,200	75,000[1]	500	500	1,518		

[1] Ak-Chin values are not additive because system losses on the 50,000 af of Colorado River Priority water are borne by San Carlos Tribe, except in the instance of CAP deliveries restricted to Colorado River rights only [first priority]. In this case system losses are borne by Ak-Chin.

3.14-4
Reductions in Indian CAP Water Supplies During Times of Shortage on Colorado River
Likely Future with GRIC Settlement

	CAP Water Supply	Reduction	GRIC	San Carlos	Tohono O'Odham	Tonto Apache	Yavapai Apache	FMIC	SRPMIC	Ak Chin	Pascua Yaqui	Yavapai Prescott	Unassigned HVID	Total Reserved Federal	Accumulated Reductions per Priority	Reductions
Fifth Priority	1,415,000		none	none	none	none	none	none	none	none	none	none	none	none		
		115,000														
	1,300,000		38,029		8,892				1,577					22,010	70,508	
Agricultural		215,000														
	1,200,000		71,097		16,625				2,948					41,149	131,819	
		315,000														
	1,100,000		104,166		24,357				4,319					60,288	193,130	
		364,698														
	1,050,302		120,600		28,200				5,000					69,800	223,600	223,600
		50,302														
Fourth Priority	1,000,000		1,339	1,429											2,767	
		125,302														
	925,000		3,334	3,559											6,894	
M & I		128,823														
	921,479		3,428	3,659											7,087	230,687
		21,479														
Third Priority	900,000		18,047	1,501	334				555	1,043					21,479	
		51,505														
Indian Ag.	869,974		43,275	3,600	800				1,330	2,500					51,505	282,192
		69,974														
Second Priority	800,000		14,072	4,748	3,928	11	105	1,592	1,045	1,964	44	44	133		27,684	
		169,974														
	700,000		34,182	11,533	9,542	27	254	3,866	2,538	4,771	106	106	322		67,248	
M & I and Indian		269,974														
	600,000		54,292	18,317	15,156	43	404	6,141	4,032	7,578	168	168	511		106,812	
		369,974														
	500,000		74,402	25,102	20,770	59	554	8,416	5,525	10,385	231	231	701		146,375	
		469,974														
	400,000		94,512	31,887	26,384	75	704	10,690	7,018	13,192	293	293	890		185,939	
		569,974														
	300,000		114,622	38,672	31,998	91	853	12,965	8,511	15,999	356	356	1,079		225,502	
		669,974														
	200,000		134,732	45,457	37,612	107	1,003	15,240	10,005	18,806	418	418	1,269		265,066	
		769,974														
	100,000		154,842	52,242	43,226	123	1,153	17,514	11,498	21,613	480	480	1,458		304,630	
		799,074														
	70,900		161,197	54,386	45,000	128	1,200	18,233	11,970	22,500	500	500	1,518		317,132	599,324
First Priority *Colo. River*	0	70,900							20,900	47,500					68,400	
Total Reductions			328,500	61,645	74,000	128	1,200	18,233	39,200	75,000[2]	500	500	1,518	69,800		

[1] Due to ongoing GRIC negotiations, Reclamation decided to use the traditional USBR interpretation of shortage sharing criteria to compare the relative differences among alternatives. Reclamation believes that the negotiated shortage sharing criteria to be included in the GRIC settlement will not impact the relative differences among alternatives.

[2] Ak-Chin values are not additive because system losses on the 50,000 af of Colorado River Priority water are borne by San Carlos Tribe, except in the instance of CAP deliveries restricted to Colorado River rights only [first priority]. In this case system losses are borne by Ak-Chin.

Losses of fifth priority water impacts only GRIC, Tohono O'Odham Nation (TON), Salt River Pima Maricopa Indian Community (SRPMIC) and the United States. Fourth priority losses impact only GRIC and the San Carlos Apache Tribe (San Carlos). Third priority Indian agricultural water losses impact GRIC, San Carlos, TON and SRPMIC. If Colorado River shortages reduce CAP deliveries below 869,974 af, thereafter all Indian tribes are affected on a proportional basis, except for SRPMIC and Ak Chin, who have rights to Colorado River water. Tables 3.14-3 and 3.14-4 show reductions within each priority as water supplies diminish for selected delivery and supply scenarios.

3.14.3.2 ENVIRONMENTAL CONSEQUENCES

3.14.3.2.1 Impacts Resulting from Baseline Conditions and Alternatives

Under the current CAP operational assumptions regarding shortage on the Colorado River, diversions to the CAP are estimated to be restricted to one mafy with deliveries of about 925,000 af.

The assumptions and estimated shortages of CAP Indian water deliveries determined in this EIS did not consider implementation of any proposals to provide for firming of the CAP Indian water supply. Should firming programs be developed for portions of the non-Indian agricultural priority water supply allocated to the Tribes, the reductions calculated in this EIS may be overstated. The relative impacts between alternatives shown here are not anticipated to change significantly.

Baseline. Reclamation estimates of baseline conditions show a zero percent chance of shortage for the period 2002 through 2016. For the period 2002 through 2050, the average chance of shortage is about 35.7 percent. Thus, over the next 49 years, it is expected that 17.5 of those years will be shortage and 31.5 will be either normal or surplus. This scenario would result in a loss of about 120,645 af of M&I priority water out of a total of 1,722,105 af over a 49-year period for Indian Tribes.

Under the current definition of shortage impacts to CAP, a shortage year would necessarily eliminate delivery of any non-Indian agricultural priority water. In the Likely Future Without scenario, Indian tribes would lose 51,800 af of non-Indian agricultural priority water in each shortage year, or a total of about 906,500 af out of a total of 2,538,200 af over a 49-year period. Under the With Settlement scenario, the annual loss would be 223,600 af of non-Indian agricultural water, or a total of 3,913,000 af out of a total of 10,956,400 af over the 49-year period.

Basin States Alternative. Model runs by Reclamation indicate a 39.2 percent chance of shortage over the next 49 years. Under the Preferred Alternative, 19.2 years of shortages are projected to occur. The loss of M&I priority water for Indian Tribes would total about 132,365 af out of a total of about 1,722,105 af. For the Likely Future Without Settlement scenario, total non-Indian agricultural priority water lost would be

about 994,560 af. With Settlement, the total non-Indian agricultural priority water lost would be about 4,293,120 af.

Six States Alternative. Employing the assumptions of the Six State Plan, the period of a zero percent chance of shortage would be 2002 through 2008, a slightly shorter period compared to baseline conditions. For the period 2002 through 2050, the average chance of shortage would be about 38.8 percent. This results in 19 years of shortage and 30 years of normal or surplus years. About 130,986 af of M&I water out of a total of 1,722,105 af would be lost to the Indian Tribes during the next 49 years.

Applying the current shortage criteria would mean that all non-Indian agricultural priority water would not be delivered in a water short year. In the future without settlement scenario, Indian Tribes would lose a total of about 984,200 af out of a total of 2,538,200 af. In the With Settlement scenario, the total loss to Indians would increase to about 4,248,400 af of a total of 10,956,400 acre-feet.

California Alternative. The California Alternative is more restrictive in that the period of zero percent chance of shortage would last only five years between 2002 through 2006. An average 42.3 percent chance of shortage would prevail through the study period. Hence, the total years of shortage would increase to 20.7. The loss of M&I priority water for Indian Tribes would total to about 142,706 af of a total of about 1,722,105 af during the next 49 years.

As in the previous two scenarios, a Colorado River shortage would eliminate any deliveries of non-Indian agricultural priority water. For the Likely Future Without Settlement scenario, the total water not delivered to Indians would be about 1,072,260 af out of a total of about 2,538,200. With Settlement, the total water lost by Indians would be about 4,628,520 acre-feet out of a total of about 10,956,400 af.

Shortage Protection Alternative. Estimates by the Reclamation show a 41.1 percent chance of shortage over the next 49 years. Therefore, the total number of years of shortage would increase to 20.3. The expected loss of M&I priority water for Indian Tribes would total about 139,948 acre-feet over the study period.

For the Likely Future Without Settlement, total non-Indian agricultural priority water not available for delivery to Indians would be about 1,051,540 af. With Settlement, total non-Indian agricultural priority water lost would be about 4,539,080 af.

Flood Control Alternative. The number of years of zero percent shortage are 9 years, 2002-2010. The chance of shortage is 35.5 percent over the 49-year period. The years of shortage are 17.4 years. M&I water loss to Indians is 119,956 af. Under the Likely Future Without, total loss of non-Indian agricultural priority water is 901,320 af. With Settlement, 3,890,640 af non-Indian agricultural priority water would be lost.

3.14.3.2.2 Summary of Impacts

While shortages on the Colorado River and the resulting impact upon the CAP are impossible to eliminate, the selection of interim surplus criteria does affect the magnitude of impacts. The most severe impact upon water resources of central Arizona Indian tribes and communities is projected to occur under the California Alternative. Conversely, the least impact upon Indian CAP water supplies is projected to occur under the Flood Control Alternative.

Comparison of the Preferred Alternative with the baseline projections results in a loss of Indian M&I water of about 11,720 af. Under the Likely Future Without Settlement scenario, the loss of non-Indian agricultural priority would be about 88,060 af and the impact under the With Settlement scenario would be a loss of about 380,120 af.

Compared with the baseline projections, the implementation of the Six States Alternative would increase total shortages to Indians in the CAP service area by 10,341 af of M&I water and under the Likely Future Without Settlement scenario 77,700 af of non-Indian agricultural priority water. Similarly, under the Likely Future Without Settlement scenario, the loss of non-Indian agricultural priority water would increase to 335,400 af.

Comparisons of the California Alternative with the baseline shows that the M&I impact would be 22,061 af and under the Likely Future Without Settlement scenario the non-Indian agricultural priority water impact would be a loss of 165,760 af. Under the With Settlement scenario, the loss of non-Indian agricultural priority water would increase to 715,520 af.

Comparison of the Flood Control Alternative to baseline projections shows gains to Indian CAP water users of 689 af of M&I water. Under the Likely Future Without scenario, Indians would gain 5,180 af of non-Indian priority water. Under the With Settlement Scenario, Indians would gain 22,360 af of non-Indian agricultural water. This alternative is the best alternative for Indian CAP water users and Indian trust asset protection.

Finally, comparing the Shortage Protection Alternative with the baseline, the M&I impact would be a loss of 14,174 af. The impact to non-Indian agricultural priority water would be a loss of 145,040 under the Likely Future Without Settlement scenario and With Settlement, the loss would be 626,080 af.

3.15 ENVIRONMENTAL JUSTICE

Environmental justice refers to the fair treatment of people of all races, income and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative impacts resulting from the execution of environmental programs. Executive Order 12898, dated February 11, 1994, establishes the achievement of environmental justice as a federal agency priority:

> *To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States…*

The memorandum accompanying the order directs heads of departments and agencies to analyze environmental effects of federal actions, including human health, economic and social effects when required by NEPA and to address significant and adverse effects on minority and low-income communities. Interior and Reclamation policy and strategy for addressing environmental justice also stresses the importance of providing opportunities for community involvement in the NEPA process considering the effects of Reclamation's decisions on minority and low income populations and communities and identifying mitigation measures in consultation with the affected communities.

Populations that depend on the Colorado River for their water supply include minority and low-income communities in rural and urban areas in each of the seven Basin States. On- and off-reservation populations of Native American Indians are included.

Reclamation has involved potentially affected Tribes and the BIA to identify and address Tribal concerns (see Chapter 5, Consultation and Coordination). This includes Tribes with reservations along the Colorado River, as well as Tribes with Colorado River water rights in the Basin States. Tribal concerns are discussed in Section 3.14, Indian Trust Assets, and are based on further evaluation of impacts as they affect Tribal interests.

Reclamation is not aware of exposure of any minority or low-income populations to a human health or environmental hazard that would result from implementation of interim surplus criteria. No significant difference in the distribution of benefits and burdens would occur to minority or to low-income communities from any of the alternatives.

Scoping for, and public review of, the DEIS did not identify potential adverse impacts on minority populations in the United States, including Native American, Hispanic or

low-income communities. No minority or low-income communities are expected to be affected in any disproportionate way as a result of any of the action alternatives considered in this EIS. Therefore, no potentially significant environmental justice issues are analyzed further in this section.

3.16 TRANSBOUNDARY IMPACTS

3.16.1 INTRODUCTION

Potential effects on resources in Mexico could occur from changes in the frequency and magnitude of excess flows to Mexico (i.e., flows in excess of scheduled deliveries to Mexico) as a result of adoption of interim surplus criteria. The analysis in this section utilizes results of system modeling as described in Section 3.3 to determine potential changes in excess flows to Mexico and discusses the potential effects on the natural and physical environment within Mexico. The potential effects on scheduled delivery of water to Mexico under the terms of the United States-Mexico Water Treaty of 1944 (Treaty) are presented in Section 3.4, Water Supply.

This analysis of potential impacts in Mexico is fully consistent with Executive Order 12114 - Environmental Effects Abroad of Major Federal Actions and CEQ Guidance on NEPA Analyses for Transboundary Impacts, dated July 1, 1997. Each of these documents are contained within Attachment B, Environmental Guidelines for Transboundary Impacts.

3.16.2 METHODOLOGY

For the analysis of impacts in Mexico, the direct potential effect of interim surplus criteria would be associated with changes in the frequency of excess flows to Mexico. The incremental differences in excess flows to Mexico between baseline conditions and each of the interim surplus criteria alternatives were determined using modeling of the Colorado River system as described in Section 3.3.

Environmental conditions currently existing and those expected to result from the full development of the Upper Division states' apportionments are part of the baseline conditions. The impacts attributable to interim surplus criteria would include changes to excess flow frequency downstream of Morelos Dam and the reduction of available excess flows for irrigation and M&I use in Mexico. However, the potential effects of the reduced excess flows on Mexico's resources cannot be specifically determined due to the uncertainty of water use once it flows across the NIB into Mexico. The waters of the Colorado River, once delivered to Mexico, as agreed upon in the Treaty, are within the exclusive control of Mexico. The Treaty contains no provisions requiring Mexico to provide water for environmental protection, nor any requirements relating to Mexico's use of that water. It is reasonably foreseeable that Mexico will continue to maximize consumptive use of Colorado River water for agricultural, municipal and industrial purposes.

Potentially affected species that occur in Mexico and that are federally listed as endangered under the United States Endangered Species Act (ESA) are the desert pupfish (*Cyprinodon macularius*), Vaquita (*Phocaena sinus*) and totoaba (*Totoaba macdonaldi*); listed bird species which occur in Mexico include the Southwestern

willow flycatcher (*Empidonax traillii extimus*) and the Yuma clapper rail (*Rallus longirostris yumanensis*). Consideration is also given to the Yellow-billed cuckoo (*coccyzus americanus*), which is proposed for listing. Additional species of special concern and their habitat that are addressed in this section are the California black rail (*Laterallus jamaicensis coturniculus*), Elf owl (*Micrathene whitneyi),* Bell's vireo *(Vireo bellii arizonae),* and Clark's grebe *(Aechmophorus clarkii).* The Vaquita and totoaba are species associated with the Colorado River as it flows into the Gulf of California and occur only in Mexico. Critical habitat for species listed under the ESA is only designated within the United States and therefore, habitat in Mexico is not protected under the ESA. The desert pupfish and each of the bird species occur in both the United States and Mexico, and potential impacts to these species and their habitat within the United States are discussed in Section 3.8.

3.16.3 CONSULTATION WITH MEXICO

Pursuant to an international agreement for mandatory reciprocal consultations, Reclamation, through the United States Section of the International Boundary and Water Commission (USIBWC), consulted with Mexico in an effort to identify Mexico's concerns with regard to potential transboundary impacts from adoption of interim surplus criteria.

During the preparation of the DEIS, a meeting was held in Henderson, Nevada, on April 12, 2000, during which the topic of developing interim surplus criteria was described for the Mexican delegation. A subsequent meeting was held in Mexico City, Mexico, on May 11 and 12, 2000. During the May 11-12, 2000 meeting, Reclamation provided additional data which had been requested by Mexico and technical issues were discussed. Reclamation requested that Mexico provide an analysis of how the incremental changes between baseline conditions and the interim surplus criteria would affect Mexico. In response, a letter from Commissioner J. Arturo Herrera of the Mexican Section of the IBWC, was provided to the United States Section of the IBWC on May 22, 2000. The original letter, and an English translation, is included in Attachment T (Mexico advised the IBWC that there is no objection to the public release of this diplomatic document).

In this transmittal, Commissioner Herrera expressed a concern that currently proposed plans for the distribution of surplus water among the Lower Division states tend to reduce excess flows below Morelos Dam over the 15-year period of the interim surplus criteria. Mexico estimates that the elimination of these excess flows would have the following effects on the Mexican natural and physical environment:

1. Effects on the recharge of the aquifer both in quantity and quality, reducing the beneficial use of the same;

2. Increase in salinity in the 200,000 hectares (500,000 acres) of cultivation in the Mexicali Valley, since part of the surplus is used to leach this soil;

3. Deterioration in the quality of water delivered to Mexico at the Southerly International Boundary (SIB), especially in terms of salinity given that the flows of fresh water are used to reduce high concentrations of salinity at this site;

4. Deterioration in the quality of water received by Mexico at NIB in reducing the flow to the value of the Mexican demand and maintaining the discharges to the river from agricultural drains in the Yuma, Arizona area;

5. In the upper part of the Sea of Cortez, species in danger of extinction or which require special protection will be affected, such as the rarest and most scarce cetacean in the world, the sea cow (Vaquita) and the Totoaba. Also, commercial fishing activities will be affected in the region, especially shrimping and two species of Corvina, fish which had not appeared in significant numbers in the last 25 years; and,

6. In terms of the existing flora in the reach between Morelos Dam and the mouth of the Colorado River at the Sea of Cortez, in recent years around 33,000 hectares (85,500 acres) of native riparian vegetation have been restored in the channel, mostly poplars, willows, mesquite and salt cedar, among other species which are fundamental in the ecosystem since many of these are used as nesting areas for a great number of birds, such as the Yuma clapper rail, the yellow seagull, the sea swallow and the royal blue swan, among others, same which would be affected by these measures.

Coordination with Mexico continued during the DEIS review period and development of this FEIS. Reclamation met with representatives of Mexico on August 31, 2000, to brief them on the operational modeling process described in Section 3.3. In response to the DEIS, comment letters were provided to Reclamation from the Border Affairs Coordinator of Mexico's National Water Commission and from the IBWC. Both letters reiterated the issues raised in Commissioner Herrera's May 22, 2000, letter and are included in Volume III of this FEIS along with Reclamation's responses to the specific issues raised in the letters. Mexico provided further correspondence on October 10, 2000, which is also included in Attachment T. In this letter, Mexico suggests there be more consideration of habitat and species information in Mexico.

Although Reclamation recognizes the potential for the United States, acting through the Secretary of State, to continue to work with Mexico on a bi-national basis to clarify and resolve Mexico's concerns, it is not clear that the concerns raised are associated with interim surplus criteria. Issues not arising from interim surplus criteria are outside of the scope of this FEIS. However, such issues could become the subject of other cooperative, bi-national processes of a voluntary nature.

Attachment T also contains a draft document dated December 28, 1999 that states the United States "Authority and Assumptions" for the United States-Mexico consultations under the Treaty and subsequent resolutions and Minutes. Within that document, the

United States acknowledges Mexico's rights under the authority of Article 10 of the Treaty: "Mexico has the right to 1.5 maf annually." As discussed in Section 3.4.4, statistical projections from the model with respect to flows to Mexico indicated that under baseline conditions and each of the interim surplus criteria alternatives, Mexico would receive no less than its apportionment of 1.5 maf per year. Thus, interim surplus criteria would not affect the ability of the United States to meet Treaty obligations. However, as noted in Chapter 1, Mexico would share reductions in delivery if extraordinary drought conditions were to significantly reduce deliveries to Lower Division states below their basic apportionments.

The "Authority and Assumptions" also reiterates the United States position that "Mexico may schedule an additional 200,000 af of surplus annually, but does not have the right to Colorado River water beyond the 1.5 maf" and provides that the United States will develop and supply technical data that identify the potential future deliveries of up to 200,000 af of surplus for use in Mexico. Technical information regarding the frequency of occurrence of Mexico's 200,000 af delivery pursuant to the Treaty is presented with the water supply discussion in Section 3.4.4.5.

Further clarification is needed to distinguish between the delivery of surplus flows and the delivery of excess flows to Mexico. Mexico has an annual apportionment of 1.5 maf of Colorado River water, based on the provisions of the Treaty. Mexico may receive additional Colorado River water (beyond the 1.5 maf) under two conditions. First, when surplus water exists in excess of the amount that can be beneficially used by the Basin States, Mexico is apportioned up to an additional 200,000 af of water. Under current practice, this 200,000 is available when flood control releases are made. This water, which Mexico may schedule throughout the year in accordance with Article 15 of the Treaty, is also referred to as "surplus" water. This class of "surplus" water under the Treaty is distinct however, from surplus water for use in the Lower Basin states as described in Article II(B)(2) of the Decree and Article III of the LROC. Second, the delivery of excess flows to Mexico may result from flood control operations, unanticipated contributions from events such as flooding along the Gila River and/or other factors resulting in canceled water orders by water users below Parker Dam. Excess flows are therefore typically considered to be any flows that are over and above the 1.5 maf normal apportionment (or 1.7 maf in certain years) that may be available to Mexico pursuant to the Treaty. It is acknowledged that Mexico has complete autonomy as to how they choose to manage apportioned and excess Colorado River flows.

3.16.4 AFFECTED ENVIRONMENT

3.16.4.1 HISTORICAL COLORADO RIVER BETWEEN THE SOUTHERLY INTERNATIONAL BOUNDARY AND THE GULF OF CALIFORNIA

The Colorado River flows approximately 1440 miles from its headwaters in the Rocky Mountains to its mouth at the Gulf of California. The location of the Colorado River

within Mexico is shown on Map 3.16-1. The 22-mile reach of the river from the NIB to the SIB acts as the east-west boundary between Baja California in Mexico and the state of Arizona in the United States. This section of the river is referred to as the Limitrophe Division.

Although the section of the river between the SIB and the Gulf of California (which is also called the Sea of Cortez) is less than 50 air miles in length, the river meanders as much as 175 miles through this stretch (Browne, 1869; Rudkin, 1953).

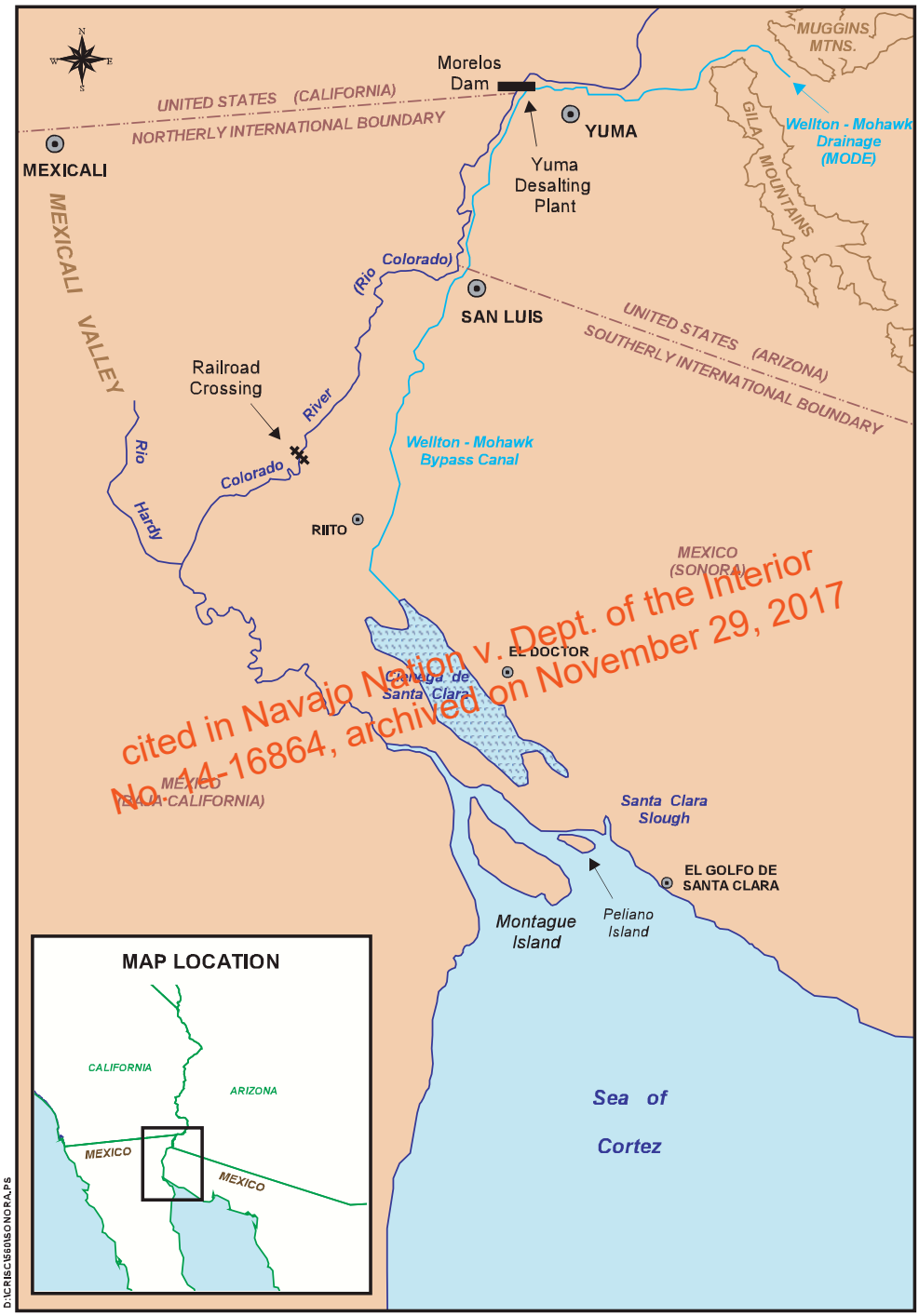
Historically, the portion of the Colorado River within Mexico could be divided into two reaches: the upper reach, which was influenced mainly by flood events; and the lower reach, which was influenced mainly by tidal fluctuations in the Gulf of California. The upper reach extends from the international boundary to approximately the confluence of the Rio Hardy and the Colorado (Mearns, 1907). The plant community found in this reach of the Colorado was similar to that found in the Yuma Valley. Large cottonwoods and dense willow thickets lined the river channel and oxbows within the floodplain (Johnson, 1869; Mearns, 1907). Honey and screwbean mesquites formed large dense thickets in areas that were subject to occasional overbank flooding (Bolton, 1930; Thwaites, 1905). Dense stands of arrowweed were noted in many historical journals throughout this reach of the river (Bolton, 1930; Mearns, 1907). Unlike the portion of the Colorado River that lies within the United States, large marshes were common within this stretch of the river. Several journals note expanses of cattails, rushes, and cane (Twaites, 1905; Mearns, 1907; Bolton, 1930). Large grass savannas were present within the floodplain that supported a cattle industry from the late 1800's through the early 1900's (Mearns, 1907; Kniffen, 1929 *in* Ohmart, 1982; Bolton, 1930).

The ecosystem found in the lower reach of the Colorado River, below the Rio Hardy to the Gulf of California was heavily influenced by tidal fluctuations in the Gulf of California and by heavy soil deposition from annual flood events. As the river meandered south of its confluence with the Rio Hardy, cottonwoods became scarce. Dense thickets of mesquite and arrowweed were still recorded on the upper terraces within this reach of the river. Dense stands of willows formed on newly deposited sediments. Large marshes, comprised mainly of cattails, rushes, and cane, dominated this stretch of the river (United States War Department, 1852; Mearns, 1907). Saltgrass became prevalent at the mouth of the river (Kniffen, 1929 *in* Ohmart, 1982).

3.16.4.2 PRESENT STATUS OF THE COLORADO RIVER BETWEEN THE NIB AND THE GULF OF CALIFORNIA

Human activities have significantly changed the lower Colorado River ecosystem since the early 1900's. Completion of Morelos Dam in 1950 allowed delivery of Colorado River water to irrigate lands in the Mexicali Valley. Flooding along the river is an infrequent event and riparian vegetation is sustained by groundwater, excess flows and/or return flows from agriculture.

Map 3.16-1
Colorado River Location Within Mexico



A 1997 survey of floodplain vegetation along the lower Colorado River (CH2MHill, 1997) classified 88 percent of over 4300 acres of the Limitrophe Division as saltcedar. Saltcedar (also commonly referred to a tamarisk) is an exotic species that appeared along the mainstem Colorado River about 1920 (Ohmart *et al.*, 1988) and has displaced native riparian species throughout the lower Colorado River.

Cottonwood willow communities were mapped on only 7.5 percent of the area, and the historically common and large marshes comprise only 3.5 percent of the communities.

The most current information available on the vegetation composition present along the upper reach of the Colorado River floodplain between the SIB and the Rio Hardy comes from a 1999 study conducted by the University of Monterrey (Guaymas), the University of Arizona, the Environmental Defense Fund, and the Sonoran Institute (Glenn, unpub. data and Luecke *et al.*, 1999). Aerial and remote sensing methods, combined with ground surveys to check accuracy, were used to estimate the number of acres of each habitat type. Habitat types were separated into two broad categories: (1) areas where Fremont cottonwood and Goodding willow comprised greater than 10 percent of the stand (determined by measuring percent vegetation cover by using remote sensing techniques); and (2) areas where Fremont cottonwood and Goodding willow comprised less than 10 percent of the stand. In stands where cottonwoods and willows comprised greater than 10 percent of the vegetative cover, the stands were further subdivided by height class and density (Open Gallery Forest, Closed Gallery Forest, and Shrub Dominated). In stands where cottonwoods and willows comprised less than 10 percent of the vegetative cover, the stands were further divided by species composition (saltcedar/arrowweed and saltcedar/mesquite).

The University of Monterrey study estimated approximately 9545 acres of greater than 10 percent cottonwood-willow habitat, 4492 acres classified as open gallery forest and 5053 acres classified as shrub dominated. Analysis of tree ring data indicated that the majority of these cottonwood-willow stands had been regenerated during high flow events over the last two decades, especially the 1993 Gila River flood event. This study also identified 25,829 acres of saltcedar/arrowweed habitat. Although the study does not specify, it is likely that these stands were actually monotypic saltcedar and monotypic arrowweed stands or clumps as arrowweed does not usually grow as a mixed stand with other vegetation types. Interestingly, this study did not identify any saltcedar/mesquite acreage within the entire study area (E. Glenn, 2000).

In December, 1998, biologists from the Bureau of Reclamation, San Bernardino County Museum, and the Upper Gulf of California and Colorado River Delta Biosphere Preserve conducted an aerial survey of the Rio Hardy and the Colorado River to determine potentially suitable Southwestern willow flycatcher breeding habitat. This survey noted that the vegetation at the confluence of the Rio Hardy and Colorado River was mostly narrow, dry stands of saltcedar. Northeast of the town of Venustiano Carranza, patches of Goodding willow and Fremont cottonwood were evident. Approximately five kilometers north of the Mexican Railroad crossing of the Colorado

River, the river contained long, linear stands of Goodding willow with a few cottonwoods also present. Approximately 15 kilometers south of San Luis, Sonora, the Colorado River begins to broaden out and from this point north to the NIB, a variety of habitats believed to be suitable breeding habitat for Southwestern willow flycatcher were present (McKernan, 1999).

The Cienega de Santa Clara (Cienega) is a large wetland complex located adjacent to the mouth of lower Colorado River in Sonora, Mexico. It is a large basin approximately 80,000 acres in size, including roughly 9700 vegetated acres with the remaining area consisting of highly saline tidal salt flats. The Cienega is typically included in discussions of the region of the Colorado River from the Rio Hardy confluence to the Sea of Cortez.

Geologically, the Cienega was formed by a tectonic slump. The Colorado River probably at many times in the geologic past flowed through the Cienega on its way to the Sea of Cortez. The Cienega retains sea water which intrudes into the southern end as a result of tidal action and evaporation results in TDS of the water exceeding 60,000 ppm in some areas. The upper end of the Cienega has two major brackish water inflows; the Main Outlet Drain Extension (MODE) and the Riito Drain (Drain). The MODE transports saline irrigation return flows from the Wellton-Mohawk Irrigation and Drainage District (WMIDD) east of Yuma, Arizona, and the Drain carries irrigation return flows from the eastern Mexicali Valley in Sonora, Mexico. The MODE and the Drain annually contribute approximately 140,000 and 28,000 af of water, respectively. There are other smaller sources of inflow to the Cienega, including springs along the eastern edge.

Salinity in the MODE water is approximately 3,200 ppm TDS while the salinity of the Drain is approximately 4,600 ppm TDS. This brackish water inflow supports the wetland vegetation at the upper end of the Cienega. The vegetation is limited by the brackish water interface with the highly saline water and soils comprising the extensive salt flats of the southern portion of the Cienega. The salt flats and associated shallow water exceed 60,000 ppm TDS. This is a result of tidal action bringing sea water into the basin, and evaporation and subsurface drainage accounting for water loss from the basin.

The vegetation in the Cienega is dominated by cattail and bulrush. The cattail and bulrush is interspersed with small channels and open water pools. The water depths in the vegetated area vary from one to four feet.

The vegetated area supports a variety of bird species. There is considerable use of the open water by waterfowl, including many varieties of ducks and geese. Several fish species are found in the fresher water areas of the Cienega including largemouth bass, carp, channel catfish, and tilapia. Several species of shiners and mollies are also found in the Cienega. Also notable is the presence of United States Federally listed threatened or endangered species, state designated special status species, and internationally

recognized species of concern. These include the Yuma clapper rail, desert pupfish, Bald eagle, and American peregrine falcon.

The present size of the vegetated area of the Cienega is a result of construction of the MODE which carries brackish irrigation return flows from the WMIDD. Prior to the completion of the MODE the vegetated area of the Cienega was less than 500 acres and this consisted mainly of a narrow fringe to the east of the present large vegetated area. Since 1977, when the MODE was completed, the vegetated area has expanded from virtually no vegetation to its present size.

Because flows into the Cienega are from the MODE and Drain and the Cienega is not connected to the floodplain of the Colorado River, natural and physical resources located within the Cienega are not anticipated to be affected by the adoption of interim surplus criteria.

The lower Colorado River supported a large estuary at its mouth in the Sea of Cortez. The historic lower Colorado River exhibited the typical annual fluctuations in flow with the peak flows generally occurring in the spring to early summer. These flows carried nutrients and sediments into the estuary, creating the conditions suited for various phases of the life history of the endemic species.

The upper end of the Sea has remarkably changed due to the lack of annual inflow from the lower Colorado River, following the construction of dams and water diversions upstream. In recent years, there have been only three events of note that have resulted in large quantities of water reaching this estuary from the lower Colorado River. High flows were experienced on the lower Colorado River during flood control operations from 1983 through 1987 and flows from the Gila River through the lower Colorado River reached the estuary in 1993. There were space building flows in the fall of 1997 and fall of 1998 and flood control releases in January 1998. All but the flows of 1983-85 and 1993 probably had little effect on the Sea of Cortez. Therefore, the hydrology of the estuary is primarily dominated by tidal processes and sediment contribution to the estuary is a result of erosion of the delta itself (Carriquiry and Sanchez, 1999).

In spite of the reduced inflow from the lower Colorado River the estuary is extremely rich in nutrients, with the corresponding richness of plankton, leading to rich amounts of organisms on up the food chain. High chlorophyll values are found in the estuary typical of very rich coastal waters (Santamaria-Del-Angel, et al. (1994). Zooplankton biomass values are similar to those of the rich central Sea of Cortez, and the values for the channels around Montague Island at the mouth of the Colorado River are as high as those of estuaries and coastal lagoons (Farfan and Alvarez-Borrego, 1992). The nutrient inflow is primarily a result of agricultural drainage into the Rio Hardy, which joins the lower Colorado River immediately above the Sea.

3.16.5 EXCESS FLOWS TO MEXICO

Currently, water has the potential to flow past Morelos Dam under three circumstances: (1) as a result of operational activities upstream (e.g., canceled water orders in the United States, maintenance activities, etc.); (2) during a Gila River flood event; and (3) during flood control releases along the mainstream Colorado River. However, Mexico has complete autonomy as to how it chooses to manage scheduled and excess flows that arrive at Morelos Dam.

Water released from Parker Dam, under orders from irrigation districts in Imperial Valley, Coachella Valley, and the lower Colorado River Valley, normally takes up to three days to reach its point of diversion. Occasionally, unforeseen events, such as localized precipitation, force the irrigation districts to cancel these water delivery orders after the water has been released at Parker Dam. Usually, the water is diverted at Morelos Dam for use in Mexico; however, some of this water may flow past Morelos Dam. The volume of water passing by Morelos Dam is rarely enough to have much effect on species and habitat in Mexico below the NIB. Adoption of interim surplus criteria will not affect water that flows past the NIB as a result of canceled water orders.

Gila River flood events are extremely rare. Only once has flow been recorded over 4,000 cfs at the Dome, Arizona, gaging station since 1941. In 1993, up to 27,500 cfs flowed past the Dome gaging station as a result of the 1993 Gila River flood (USGS, 1999). The 1993 flood created much of the habitat presently found along the Colorado River below its confluence with the Gila (Glenn, 2000).

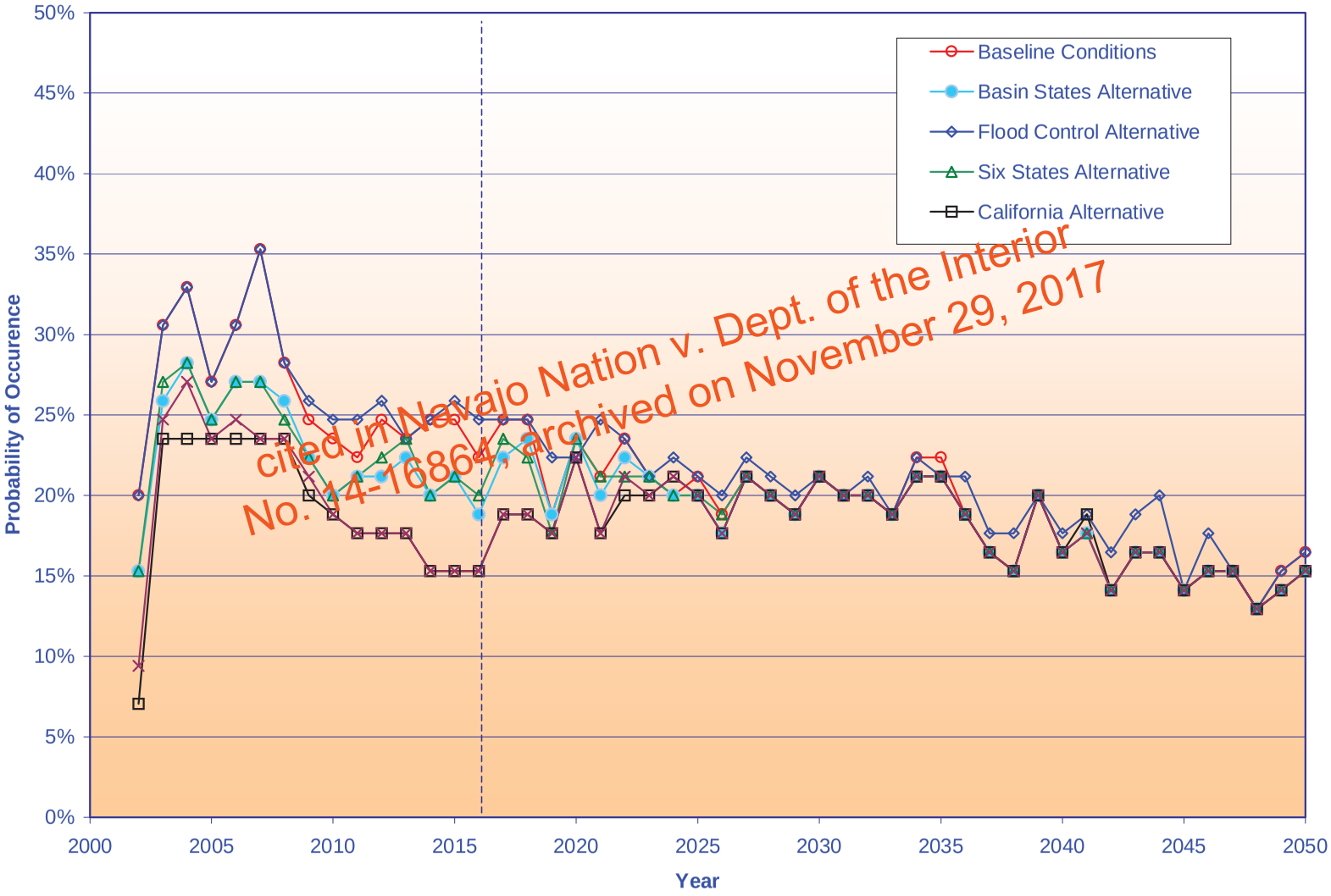
Excess flows to Mexico are almost entirely due to flood control releases originating at Hoover Dam. As discussed in Section 3.3.1.2, these flood control releases are dictated by the flood control criteria established for Lake Mead and Hoover Dam and are dependent upon hydrologic conditions.

3.16.5.1 BASELINE CONDITIONS

The potential range of water deliveries to Mexico under the baseline conditions and surplus alternatives was discussed in Section 3.4.4.5. Flows below Morelos Dam at various seasons were also analyzed in Section 3.3.4.5.4. Both the frequency and magnitude of excess flows are important factors in restoring and maintaining riparian habitat below Morelos Dam and are analyzed in more detail in this section. It should be emphasized that Mexico's management decisions at and below Morelos Dam are not modeled. This is due to uncertainty of what Mexico chooses to do with excess water. Therefore, the hydrologic analyses assume that any water in excess of Mexico's scheduled surplus deliveries are those flows that have the potential to occur below Morelos Dam.

Figure 3.16-1 presents a comparison of the frequency of occurrence of future delivery of excess flows to Mexico observed under the surplus alternatives to those of baseline

Figure 3.16-1
Probability of Occurrence of Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions



conditions. The frequency of occurrence is compiled by counting the number of modeled traces for each year that have excess flows and dividing by the total number of traces. As illustrated in Figure 3.16-1, with the exception of the Flood Control Alternative, the excess flows below Morelos Dam occur less frequently under the surplus alternatives when compared to baseline, during the interim surplus criteria period (2002 to 2016). These differences decrease to negligible amounts after 2027. The low frequency of occurrence in excess flows under the baseline conditions in the first year (2002) can be attributable to the relatively low reservoir starting conditions (approximately 33 feet below full content level at Lake Mead). The differences between the baseline and surplus alternatives, with the exception of the Flood Control Alternative, can be attributed to more frequent surplus deliveries which tend to lower Lake Mead reservoir levels. With lower reservoir levels, the frequency of flood control events (which are the primary source of the excess flows) is decreased.

The maximum frequency under baseline conditions is observed in 2006 (35 percent). Thereafter, a gradual declining tendency is observed to about 16 percent in 2050. The gradual declining trend observed under both the baseline conditions and surplus alternative coincide with the Basin States' plans to maximize consumptive use of their Colorado River water apportionment for agricultural, municipal and industrial use application, as exhibited by the Basin States' demand projections.

It is generally believed that periodic flows of 250,000 af or greater are necessary for maintaining the health of the Colorado River corridor in Mexico and the upper end of the Sea of Cortez (Leucke *et al.*, 1999) and help to restore floodplain habitat. Figure 3.16-2 presents the probability of occurrence of excess flows greater than 250,000 af and Figure 3.16-3 shows the probability of occurrence of excess flows greater than 1,000,000 af below the Mexico Diversion at Morelos Dam.

Figure 3.16-2
Potential Magnitude of Excess Flows Greater than 250,000 Acre-Feet
Below Mexico Diversions at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions

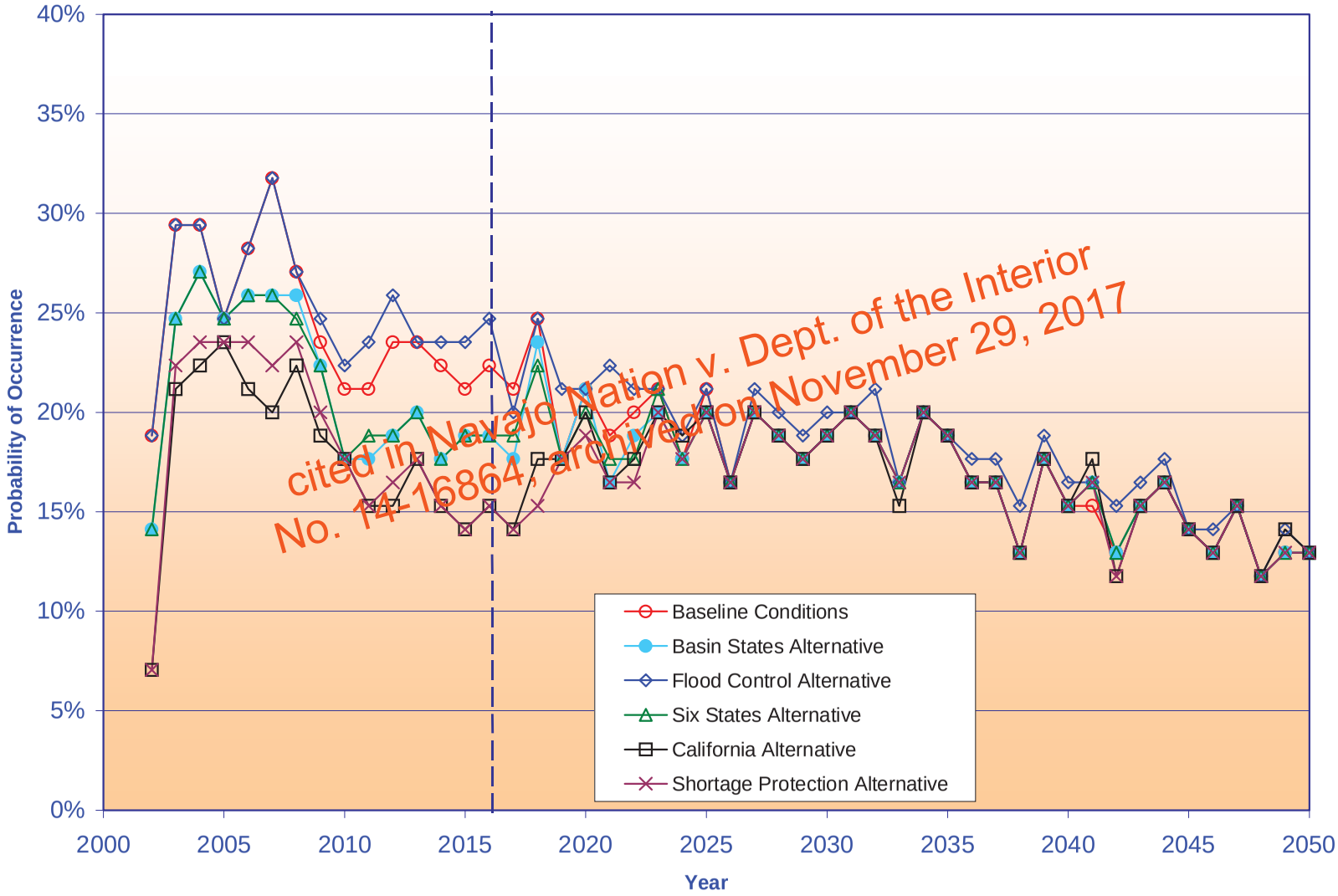
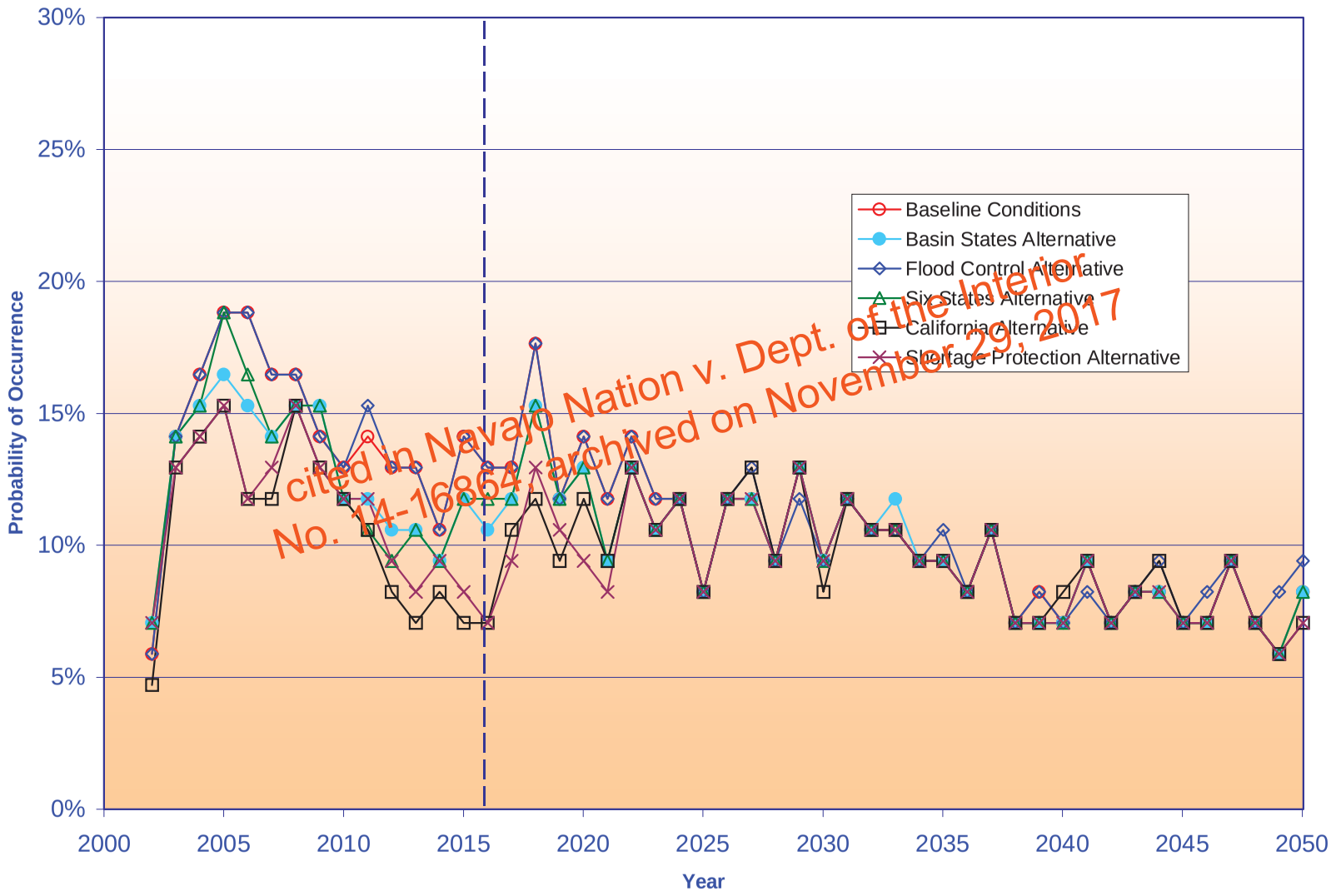


Figure 3.16-3
Potential Magnitude of Excess Flows Greater Than 1,000,000 Acre-Feet
Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions



3.16.5.2 COMPARISON OF SURPLUS ALTERNATIVES TO BASELINE CONDITIONS

Figure 3.16-1 presented a graphical comparison of the probability of delivery of future excess flows to Mexico under the surplus alternatives to those under the baseline conditions. A similar comparison for selected years is presented in tabular format in Table 3.16-1. In general, the Flood Control Alternative provides the highest frequency while the California and Shortage Protection alternatives provide the lowest frequency. The largest difference in frequency observed at the end of the interim surplus criteria period (2016) and is about seven percent for the California and Shortage Protection alternative compared to baseline conditions. This difference is reduced to approximately one percent by 2026. In 2016, the difference in frequency between the Basin States and Six States when compared to baseline conditions is three and two percent, respectively. After 2016, the differences in frequency between the surplus alternatives and baseline conditions gradually decreases to one percent or less by 2050.

Table 3.16-1
Frequency Occurrence of Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions

	Baseline Conditions	Basin States Alternative	Flood Control Alternative	Six States Alternative	California Alternative	Shortage Protection Alternative
2002	20%	15%	20%	15%	7%	9%
2003	31%	26%	31%	27%	24%	25%
2004	33%	28%	33%	28%	24%	27%
2005	27%	25%	27%	25%	24%	24%
2006	31%	27%	31%	27%	24%	25%
2007	35%	27%	35%	27%	24%	24%
2008	28%	26%	28%	25%	24%	24%
2009	25%	22%	26%	22%	20%	21%
2010	24%	20%	25%	20%	19%	19%
2011	22%	21%	25%	21%	18%	18%
2012	25%	21%	26%	22%	18%	18%
2013	24%	22%	24%	24%	18%	18%
2014	25%	20%	25%	20%	15%	15%
2015	25%	21%	26%	21%	15%	15%
2016	22%	19%	25%	20%	15%	15%
2026	19%	18%	20%	19%	18%	18%
2050	16%	15%	16%	15%	15%	15%

As discussed in Section 3.3.4.5.4, the annual volume of excess flows can be compared for the surplus alternatives and baseline conditions. Figures 3.16-4 and 3.16-5 show the cumulative distributions for years 2016 and 2050, respectively (Figure 3.3-28 showed the data for 2006). Although the frequency of occurrence of flows of a particular magnitude is decreased, the range of excess flows is preserved for the surplus alternatives when compared to baseline conditions.

Figure 3.16-4
Potential Magnitude of Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2016

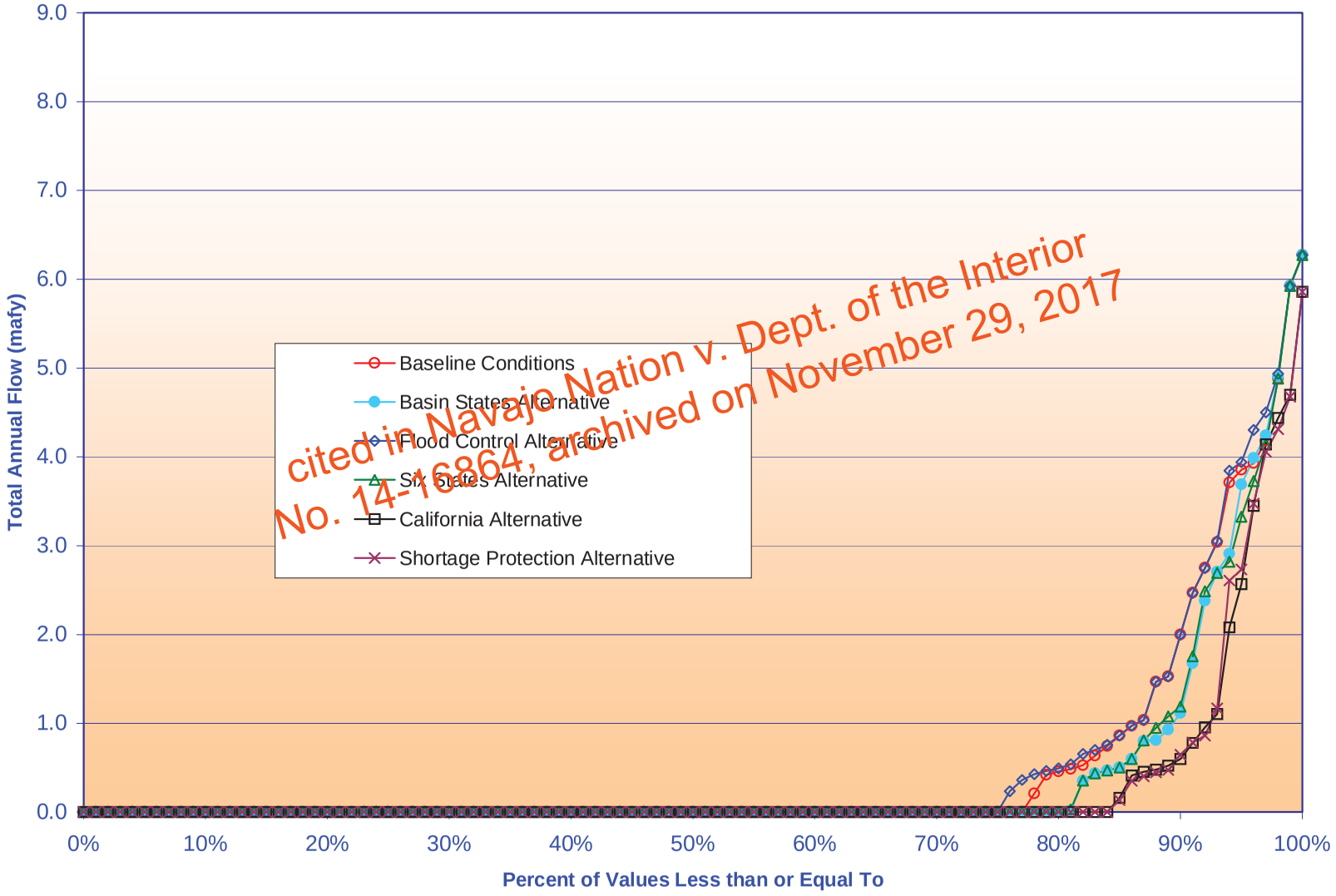
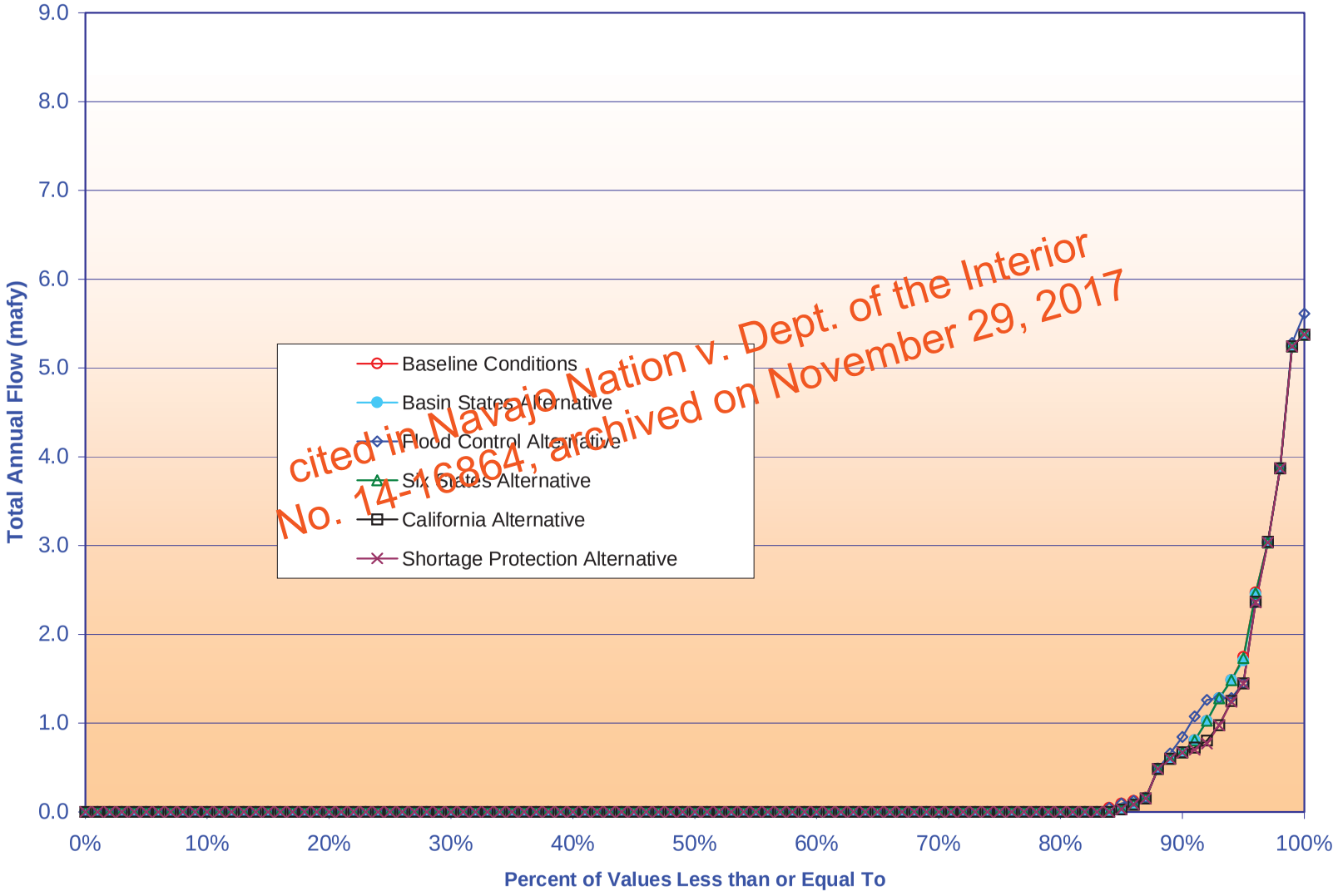


Figure 3.16-5
Potential Magnitude of Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Year 2050



Alternatively, the potential magnitudes of excess flows for the 75th and 90th percentiles are shown in Figure 3.16-6. The 75th and 90th percentile values are also presented in tabular format for years 2002 through 2026 in Table 3.16-2 and Table 3.16-3, respectively. The 75th percentile flow is defined as the flow that would not be exceeded 75 percent of the time (i.e., the minimum flow that would be expected to occur 25 percent of the time) and likewise, the 90th percentile flow would be expected to occur 10 percent of the time.

In summary, there are only minor differences in the potential magnitudes and potential frequencies of excess flows between baseline conditions and the Basin States Alternative. During the interim surplus criteria period, the average frequency of occurrence of beneficial flows (exceeding 250,000 af) in any year is 24.5 percent for baseline conditions, which is equivalent to approximately one year in four. This compares to a frequency of 17.8 percent for the California Alternative (one year in six) and 21.3 percent for the Basin States Alternative (one year in five). After the interim surplus criteria period, the average frequency of occurrence is approximately the same for all surplus alternatives and baseline (ranging between 17.0 percent and 18.2 percent or about one in every six years).

The above probabilities indicate conditions below Morelos Dam would be similar to those presumed to be beneficial. Leucke, et al, 1999 states, it is not yet possible to quantify with certainty the required volume and frequency of these high flows.

While the probable frequency of approximately one in four years under the baseline would change to a probable frequency of approximately one in five years under the Basin States Alternative, the change in benefits to species and habitat would likely be insignificant. The riparian vegetation existing along the Colorado River corridor in Mexico is extremely resilient.

Mexico has complete discretion over the use of water entering that country. As stated before, excess flows are generally diverted when possible species and habitat can benefit only when the amount of water arriving at Mexico is in excess of that which can be diverted.

Figure 3.16- 6
Potential Magnitude of Excess Flows To Mexico
90th and 75th Percentile Values

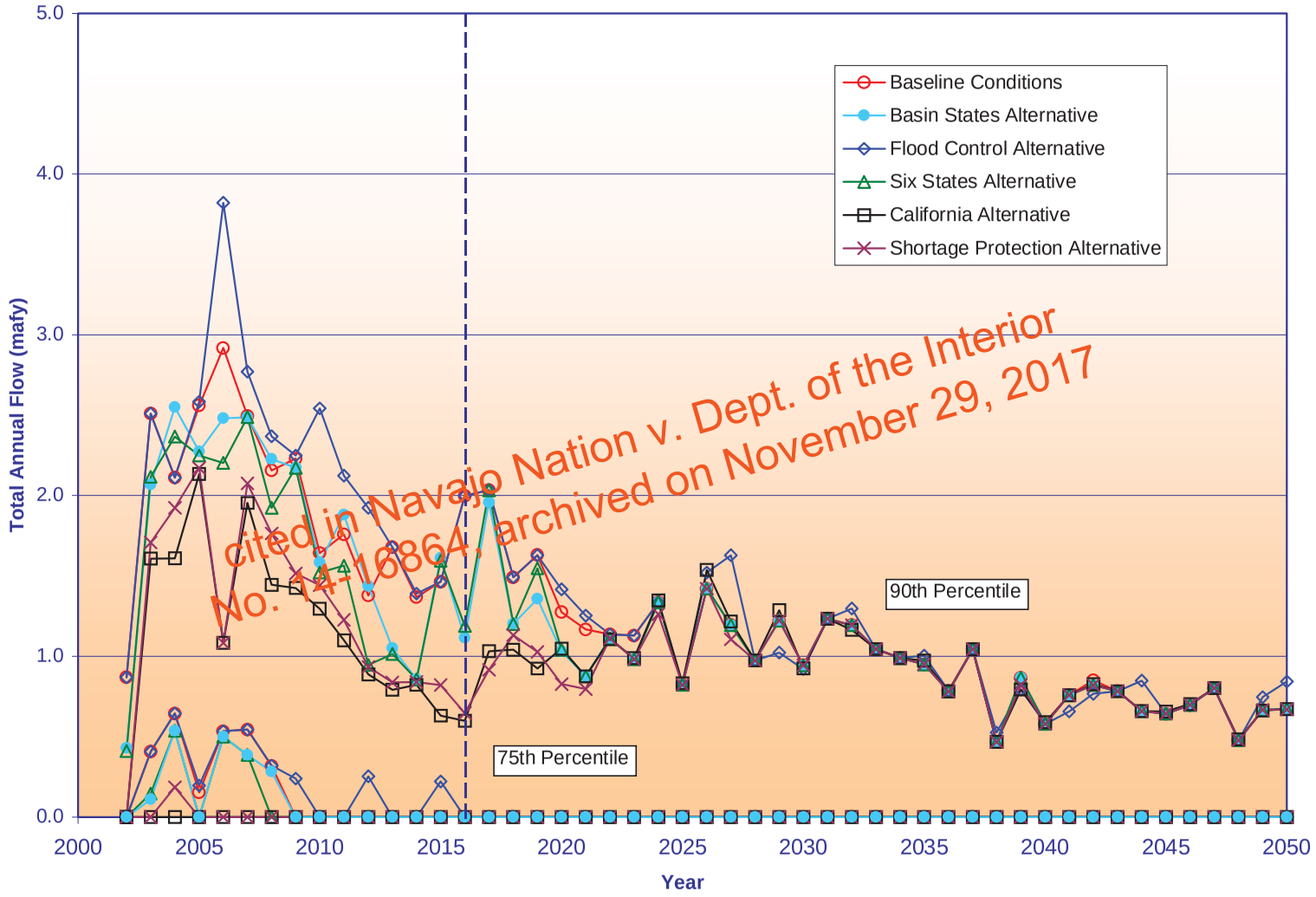


Table 3.16-2
Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions
75th Percentile Values for Selected Years (kaf)

	Baseline Conditions	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative
2002	0	0	0	0	0	0
2003	406	406	146	109	0	0
2004	645	645	536	536	0	186
2005	153	195	0	0	0	0
2006	534	534	500	500	0	0
2007	545	545	386	386	0	0
2008	318	319	0	282	0	0
2009	0	239	0	0	0	0
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	253	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	221	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	0	0	0	0	0	0
2025	0	0	0	0	0	0
2026	0	0	0	0	0	0

Table 3.16-3
Excess Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions
90th Percentile Values for Selected Years (kaf)

	Baseline Conditions	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative
2002	870	870	412	429	0	0
2003	2510	2510	2116	2068	1608	1709
2004	2112	2111	2368	2550	1610	1924
2005	2560	2584	2249	2274	2135	2171
2006	2918	3822	2203	2481	1083	1083
2007	2495	2772	2489	2489	1954	2076
2008	2157	2369	1924	2227	1445	1765
2009	2230	2249	2172	2175	1426	1516
2010	1641	2542	1522	1583	1295	1441
2011	1758	2124	1563	1881	1100	1226
2012	1378	1924	947	1438	887	934
2013	1680	1680	1014	1049	792	837
2014	1368	1391	857	857	823	840
2015	1464	1464	1595	1611	631	821
2016	1999	1999	1189	1114	599	647
2017	2034	2034	2033	1957	1033	915
2018	1492	1492	1201	1201	1041	1132
2019	1630	1629	1548	1358	924	1028
2020	1276	1417	1041	1032	1048	828
2021	1167	1254	876	876	876	796
2022	1136	1136	1112	1112	1106	1112
2023	1130	1130	981	981	988	981
2024	1338	1336	1338	1338	1348	1261
2025	823	823	823	823	833	823
2026	1422	1521	1422	1422	1537	1422

3.16.5.3 POTENTIAL TRANSBOUNDARY EFFECTS OF REDUCED FLOOD FLOW FREQUENCY

As discussed in the previous sections, modeling of baseline conditions and each of the interim surplus criteria alternatives indicates a potential for reductions in the frequency of excess flows delivered to Mexico throughout the period of analysis. Excess flows can have both positive and negative impacts on salinity, groundwater, and water available for diversion by Mexico at Morelos Dam. This section discusses the general effects of excess flows to Mexico, and the potential impacts of reduced frequencies of such flows. Potential effects on floodplain habitat and species within Mexico could also occur from a reduction in excess flows to Mexico are discussed in Section 3.16.6.

3.16.5.3.1 General Effects of Flood Flows

On the positive side, excess flows to Mexico are lower in salinity than normal flows (i.e., flows associated with traditional downstream requirements and deliveries). These flows can, therefore, improve the water quality of deliveries to farms in the United States and Mexico, thereby reducing the salinity of the deep percolation from farm application and gradually improving the quality of groundwater and drainage return flows.

Because the volume and quality of water arriving at the NIB is larger and better during flood flow conditions, the salinity levels at NIB will be lower than in normal years. The salinity of flows carried to the SIB and into Mexico closely reflect the salinity of flows arriving at NIB. These high quality flows will tend to improve the groundwater quality and raise the groundwater levels along the river channel downstream of Morelos Dam.

However, on the negative side, higher river elevations resulting from flood control releases can cause groundwater levels to rise. In agricultural and urban areas, higher groundwater levels can cause crop damage or damage to municipal facilities. Higher groundwater levels can also require increased drainage pumping after flood conditions occur to return groundwater levels to normal, non-damaging conditions.

In addition, flood flows carry more sediment, which is deposited in the river channel both upstream and downstream of Morelos Dam. This sediment deposition will have the tendency to raise river levels for normal flow conditions, raise the groundwater levels near the river and reduce flow carrying capacity of the river channel both above and below Morelos Dam.

Flows in excess of 15,000 cfs below Imperial Dam and below Morelos Dam can be very destructive and can cause substantial damage to levees, river structures, and other private and public facilities. Considerable expense can be incurred to protect these facilities.

3.16.5.3.2 Effects of Reduced Excess Flows

As discussed in Section 3.16.5.1 and 3.16.5.2, modeling indicates an increasing likelihood over time of reduced frequency of excess flows to Mexico. Such reductions would occur to varying degrees under baseline conditions and each of the alternatives. The potential effects in Mexico of reduced excess flow frequencies could include the following:

- Mexico would have fewer opportunities to take water in excess of their maximum water order for uses such as groundwater recharge for agricultural and municipal wells, leaching of salts from farm soils, raising of additional crops, and improvement of water quality being delivered to farms along the east bank of the Colorado River.

- Groundwater levels downstream of areas being farmed in the United States and Mexico would decline and salinity levels of the groundwater would be expected to increase. However, damage caused by high groundwater would be less frequent and less substantial than experienced in the past. Also, it would take less time and less volume of additional drainage pumping to return groundwater to acceptable levels, reducing impacts to the salinity of flows arriving at NIB once deliveries to Mexico return to normal levels.

- The frequency of future excess flows would likely be less than those experienced in the past, reducing the potential for damage to public and private facilities and reducing costs associated with floods and flood control releases. Also the duration of flood control releases would be less, further reducing damage to levees and river control structures.

- Less sediment control work would be required in the river channel, reducing maintenance costs for both Mexico and the United States.

3.16.5.4 Summary Of Potential Effects To Special-Status Status And Habitat In Mexico

3.16.5.5 Potential Effects to Habitat in Mexico

The historic reduction in Colorado River flows below the NIB affected the ecosystem of the delta. However, these reductions have been instituted while meeting the requirements of an international treaty and the diversion and use of such treaty water is solely at Mexico's discretion. Except for periods of high flow or flood control operations, little water reaches the delta and the upper Gulf. It is not within Reclamation’s discretionary authority to make unilateral adjustments to water deliveries to the international border.

Riparian habitat, along the Colorado River between the NIB and the Gulf of California, requires scouring flood events for regeneration. Both the frequency and magnitude of excess flows are important for this regeneration. As discussed previously, changes in the potential frequency and magnitude of beneficial excess flows (flows greater than 250,000 af) is not significantly affected by interim surplus criteria. As shown in Figure 3.16-4, under baseline conditions, the frequency of such excess flows to Mexico could potentially decrease over the next 25 years. The frequencies under the interim surplus alternatives follow this trend albeit lower during the interim surplus criteria period, with the maximum differences between the surplus alternatives and the baseline conditions occurring in 2015.

It is difficult to quantify the effect of reduced frequencies of excess flows to the existing habitat. The majority of the existing cottonwood-willow habitat regenerated during the 1983-87 Colorado River and 1993 Gila River flood events. This habitat has been sustained by a variety of potential water sources, including high groundwater and agricultural runoff.

Special status species that utilize riparian habitat along the Mexican reach of the Colorado River could be affected by the decrease in frequency of flood control releases and excess flows that occur below the Mexico Diversion at Morelos Dam. Existing habitat is, and will continue to be adversely affected by wildfire, agricultural clearing, and clearing for channel maintenance and flood control. New habitat is less likely to regenerate due to the decrease in flood frequency. However, these events are likely to occur whether or not surplus criteria are implemented. As shown in Figure 3.16-1, all alternatives (including the baseline condition) indicate a decrease in frequency of flood control releases and excess flows over the period of analysis (2002 through 2050), due to increased Upper Basin depletions.

The Cienega de Santa Clara is the largest wetland in the delta. This action will not affect the habitat occurring there, as the Cienega is sustained by irrigation return flows from the United States that will not be affected by the proposed action. The Rio Hardy wetlands occurring at the confluence of the Rio Hardy are also expected not to be affected by the action. These wetlands are also sustained by agricultural runoff, from the west side of the Mexicali Valley.

3.16.5.5.1 Potential Effects to Special Status-Species in Mexico

3.16.5.5.2 Desert pupfish

The desert pupfish (*Cyprinodon macularius)* is a small killifish with a smoothly rounded body shape. Adults generally range from 2-3 inches in length. Males are smaller than females and during spawning the males are blue on the head and sides and have yellow edged fins. Most adults have narrow, dark, vertical bars on their sides. The species was described in 1853 from specimens collected in San Pedro River, Arizona. There are two recognized subspecies and possibly a third form (yet to be

described). The nominal subspecies, *Cyprinodon macularius macularius*, occurs in both the Salton Sea area of southern California and the Colorado River delta area in Mexico and is the species of concern, herein. The other subspecies is *C.m. eremus* and is endemic to Quitobaquito Spring, Arizona.

The desert pupfish was listed as an endangered species on March 31, 1986. Critical habitat for the species was designated in the United States at the time of listing and included the Quitobaquito Spring which is in Organ Pipe Cactus National Monument, and San Felipe Creek along with its two tributaries Carrizo Wash and Fish Creek Wash in southern California. All of the former and parts of the latter were in federal ownership at the time of listing. Reclamation purchased the remaining private holdings along San Felipe Creek and its tributary washes and turned them over to California Department of Fish and Game in 1991. All of the designated critical habitat is now under state or federal ownership.

Desert pupfish are adapted to harsh desert environments and are extremely hardy. They routinely occupy water of too poor quality for other fishes, most notably too warm and too salty. They can tolerate temperatures in excess of 110° F; oxygen levels as low as 0.1 ppm; and salinity nearly twice that of sea water (over 70,000 ppm). In addition to their absolute tolerance of these parameters, they are able to adjust and tolerate rapid, extreme changes to these same parameters (Marsh and Sada 1993). Pupfish have a short life span, usually only two years, but they mature rapidly and can reproduce as many as three times during the year.

Desert pupfish inhabit desert springs, small streams, creeks, marshes and margins of larger bodies of water. The fish usually inhabit very shallow water, often too shallow for other fishes. Present distribution of the subspecies *C. m. macularius* includes natural populations in at least 12 locations in the United States and Mexico, as well as over 20 transplanted populations.

One of the natural populations in Mexico is in the Cienega de Santa Clara, a 100,000-acre shallow basin on the Colorado River delta 60 miles south of the United States/Mexico border. The area is about 90 percent unvegetated salt flats with a number of small marsh complexes along the eastern edge of the bowl where it abuts an escarpment. The area is disconnected from both the Colorado River and the Gulf (Sea of Cortez), however extreme high tides result in the lower half of the basin becoming inundated to a level of one foot or less of salt water from the gulf. The marsh areas on the east side are small and are spring fed. The largest marsh complex is on the northeast side where two agricultural drains provide relatively fresh water inflows. The desert pupfish occur in a number of these marsh complexes.

Reclamation biologists discovered this population of desert pupfish in 1974 during preproject investigations for a feature of the Colorado River Basin Salinity Control Project. At that time, inflow to the Cienega was by agricultural return flows from the

Riito Drain in Mexico which provided about 35 cfs flow. The project feature being investigated was construction of a bypass canal for drain water from WMIDD.

Desert pupfish were found in the marsh along with mosquito fish, sailfin mollies, carp and red shiners. The bypass canal was completed in 1978 and provided a steady flow of over 150 cfs to the marsh. Based upon aerial surveys, the added inflow caused the marsh to grow from an estimated 300 acres of vegetated area in 1974 to roughly 10,000 acres in 1985. Recent aerial surveys show that while the inflows have continued, the marsh has not continued to grow in size. Desert pupfish continue to exist in the marsh. The fish tend to inhabit the shallow edges of the marsh in vegetated areas. Desert pupfish from the Cienega were transported to Dexter National Fish Hatchery during May 1983, and many of the transplanted populations in the United States are of this subspecies and stem from this initial transplant.

Reclamation has determined that desert pupfish would not be affected by the implementation of interim surplus criteria. The main population exists in the Cienega de Santa Clara which is not dependent on flows from the lower Colorado River. As such, the potentially reduced frequency of excess flows that may occur as a result of the adoption of interim surplus criteria would not have a direct effect on the water in the Cienega. The other populations of desert pupfish are not found proximate to the Colorado River.

3.16.5.5.3 Vaquita

The Vaquita (*Phocaena sinus)* is a small porpoise and is widely believed to be the most endangered marine cetacean in the world (Klinowska 1991; Taylor and Gerrodette 1993). It is also the only endemic species of marine mammal from the Gulf.

The Vaquita was listed as “Vulnerable” in 1978 by the IUCN-The World Conservation Union [formerly the International Union for Conservation of Nature and Natural Resources (IUCN)] in their Red Data Book and also in the Mexican list of wild vertebrates in danger of extinction. The Vaquita was also listed in Appendix I of the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora on 28 June 1979, and in February 1985 as an endangered species under the United States Endangered Species Act. Recently, this porpoise was classified as “Endangered” in the IUCN Cetacean Red Data Book.

The Vaquita is very similar in external morphology to the harbor porpoise (*Phocaena phocaena*). Based on a very small sample and a maximum recorded total length of about five feet, the Vaquita may be the smallest of all the delphinoids (Brownell *et al.,* 1987). The pectoral fins are larger and the dorsal fin is higher proportionally to the body length than in any other extant porpoise species (Brownell *et al.,* 1987).

The coloration of adult Vaquitas is unique. On the dorsal portion, the color is dark gray, the sides are pale gray, and the ventral surface is white with some pale-gray

elongated spots. The porpoise has a large, dark eye spot and lip patches that contrast with the gray background (Ramirez, 1993).

The life history of the Vaquita appears, in many ways, to be similar to its better-studied congener, the harbour porpoise, from the Bay of Fundy, Canada and the Gulf of Maine. Both species have a maximum longevity of about 20 years (Hohn, *et al.,* 1996). Little is known about the reproductive biology of the species. It has been suggested that calving occurs in the spring and mating in late spring or soon thereafter (Vidal, 1990). Food habits are also practically unknown; Fitch and Brownell (1968) reported small fish such as grunt (*Orthopristis reddingi*) and croaker (*Bairdiella icistia*) from stomach contents and Brownell (1982) also reported squid. More details regarding the life history of the Vaquita are documented in Vidal (1995) and Hohn, *et al.,* (1996).

The range of the Vaquita is restricted to the northwestern corner of the Gulf of California, Mexico (Jaramillo-Legorreta, *et al.,* 1999), representing the most restricted range for any cetacean species (Ramirez 1993). Stranding data, mortalities in fishing nets and sightings of live animals all confirm that the present distribution of Vaquita is concentrated in a small area rear Rocas Consag in the northwestern Gulf of California (Gerrodette, *et al.,* 1995). Sightings outside of this region (south of 30E 45' N latitude) may represent occasional departures by some individuals from the center of distribution (Silber and Norris, 1991) or temporary extensions in distribution due to climatic changes (Vidal, 1990). The region south of Puerto Penasco, Sonora, Mexico, remains insufficiently monitored to further increase the accuracy of population estimates and to establish the southern limit of the geographic range of the species (Ramirez 1993). The range of the Vaquita overlaps that of the endangered totoaba, to which it may be linked ecologically (Ramirez 1993).

A number of factors make the Vaquita an extremely difficult species to survey; habitat characteristics such as turbid water, fraction of the time spent at the surface, elusive behavior, and its erratic surfacing mode (Ramirez 1993). Despite these difficulties, and biases in collection of survey data, it is clear that the species is rare. The total population size is estimated to be 567 animals, with a 95 percent confidence interval from 177 to 1073 (Jaramillo-Legorreta, *et al.*, 1999).

The Vaquita is particularly vulnerable to incidental mortality in gillnets. The Vaquita has probably been incidentally caught in gillnets since the mid-1920's. It can be assumed the significant expansion of the fishing industry during the early 1940's further reduced the population (Vidal, 1995). Vaquita bycatch in gillnet fisheries was identified as a defining factor which may drive the species to extinction. The total estimated incidental mortality caused by the fleet of El Golfo de Santa Clara was 39 Vaquitas per year, over 17 percent of the most recent estimate of population size. El Golfo de Santa Clara is one of three main ports that support gillnet fisheries throughout the range of the Vaquita. The fishing effort for San Felipe, Baja California appears to be similar to that of El Golfo de Santa Clara, suggesting that this estimate of incidental mortality of Vaquitas represents a minimum (D'Agrosa, *et al.*, 2000).

Ramirez (1993) identified three actual and potential impacts to the Vaquita: incidental mortality caused by fishery activities, reduced Colorado River flows into the Gulf of California and pollution from various sources associated with Colorado River flows into the Gulf.

Rojas-Bracho and Taylor (1999) concluded habitat alteration from reduced flow of the Colorado River does not currently appear to be a risk factor because productivity remains high in Vaquita habitat. Pollutant loads are low and pose low to no risk. Reduced fitness from inbreeding depression and loss of genetic variability are unlikely to pose high risk currently, though risk will increase if Vaquitas remain at low abundance over long periods of time. Mortality resulting from fisheries is the greatest immediate risk for Vaquitas.

Therefore, Reclamation concluded that the implementation of any of the interim surplus criteria alternatives would have no effect on the Vaquita.

3.16.5.5.4 Totoaba

The totoaba *(Totoaba macdonaldi)* is a fish endemic to the Gulf of California. In 1976 the species was listed as threatened under the Convertion on International Trade in Endangered Species (CITES). On May 21, 1979, the totoaba was listed in the United States as endangered pursuant to the Endangered Species Act (44 FR 99).

Totoaba are large schooling fish that undertake a seasonal migration within the Gulf and may live to 25 years of age (Cisneros-Mata *et al.,* 1995). Totoaba are the largest of the sciaenid fish, with a maximum reported weight of over 100 kg and a length of over two meters (Flanagan and Hendrickson 1976). Adults spawn in the shallow waters of the Colorado River delta in the upper Gulf where they remain for several weeks before migrating south. Spawning originally occurred from February to June. More recently, it has been determined that spawning takes place from February through April (Cisnereo-Mata, *et al.*, 1995). Juveniles are thought to emigrate south after spending two years in the upper Gulf, which is considered their nursery ground (Flanagan and Hendrickson 1976).

Juvenile fish eat small benthic organisms, mainly crabs and fish, amphipods, and shrimp; adults eat larger more pelagic items, such as sardines and adult crabs (Flanagan and Hendrickson 1976, Cisneros-Mata *et al.,* 1995). Many aspects of the biology and ecology of this species are unknown.

The totoaba is thought to have ranged from the mouth of the Colorado River to Bahia Concepcion on the west coast of the Gulf and to the mouth of the El Fuerte River in the east (Jordan and Everman 1896 *cited in* Berdegue 1955). Historically, millions of totoaba migrated north in the spring to spawn at the mouth of the Colorado River (Gause 1969).

A more thorough description of the life history of the totoaba is found in Cisneros-Mata, *et al.*, 1995.

The first commercial harvesting of totoaba began in the early 1890s and by 1942, annual catches peaked at 2.3 million kg. In 1975, the catch had declined to 59,142 kg (Lagomarsino 1991). Beginning as early as 1940, the Mexican government imposed restrictions on the commercial fishery for totoaba, and in 1975, the government designated totoaba as endangered and declared an indefinite prohibition on all types of commercial and recreational fishing (Flanagan and Hendrickson 1976).

In April-June 1994, the School of Marine Sciences of the Autonomous University of Baja California developed a field technique that permitted successful capture and transport of totoaba broodstock from the Upper Gulf to the laboratory at Ensanada (True *et al.*, 1997). They were able to keep these specimens of totoaba alive and successfully spawned them. In October of 1997 they released 250 juveniles, back into the upper gulf. These were four months old and 20-25 cm long.

Despite the closure of the fishery, illegal exploitation continues. It is believed that the incidental catch of juvenile totoaba in the shrimp trawling fishery is the principal factor affecting recovery of the species (Barrera-Buevara, 1990). Much of the illegal gillnetting for totaba occurs during the spawning migration. Current knowledge indicates that decrease of the adult stock may be responsible for the decline experienced by the totoaba population (Cisneros-Mata, *et al.*, 1995).

Cisneros-Mata, *et al*, (1995) concluded that a negative impact on totoaba due to decreased flow from the Colorado River may be questionable because the claimed effects would have caused extinction of totoaba over 40 years time. Flanagan and Hendrickson (1976) concluded that recruitment and over-fishing explained the decline better than habitat alteration. It is estimated that a steady flow of water reaching an annual total of 1.6 maf would be necessary to restore the brackish water conditions that historically occurred in the estuary (US Bureau of Reclamation file data). Even if that amount of water were available at present, Reclamation has no control over Colorado River water once it reaches the NIB.

As illustrated in Figure 3.16-1, the adoption of interim surplus criteria has the potential to reduce the frequency of occurence of excess flows below the Mexico diversion of Morelos Dam by as much as seven percent during the interim surplus criteria period (California and Shortage Protection alternatives in year 2016). However, the range of excess flows (magnitude) that are expected to occur, albeit less frequent, under the surplus alternatives are not expected to vary from those observed under baseline conditions (see Figures 3.16-4 and 3.16-5). Therefore, based upon this potential reduced frequency of excess flows, the inadvertent mortality resulting from commercial fishing as described above and Reclamation's lack of discretion over Colorado River water in Mexico led Reclamation to determine that the interim surplus criteria may affect but is not likely to adversely affect the totoaba.

3.16.5.5.5 Southwestern Willow Flycatcher

Willow flycatchers (*Empidonax traillii extimus)* are found throughout North America and are further divided taxonomically into four subspecies, *E.t. brewseri, E.t. adastus, E. t. traillii*, and *E.t. extimus.* The latter, *E.t. extimus*, the southwestern willow flycatcher, breeds on the Lower Colorado River and its tributaries (McKernan *et al.*, 1996, 1997, 1998, 1999, 2000). In January 1992, the Service was petitioned to list the southwestern willow flycatcher, *Empidonax traillii extimus* as an endangered species. In July 1993, the species was proposed as endangered with critical habitat (58 FR 39495). On February 27 1995, the Service listed the southwestern willow flycatcher as an endangered species (60 FR 10694). The Service has not issued a recovery plan to date and the designated critical habitat does not include the lower Colorado River (60 FR 10694).

As a member of the genus *Empidonax,* Willow flycatchers are known for the difficulty in identifying individuals to species in the field (Phillips *et al.*, 1964; Peterson 1990; Sogge *et al.*, 1997a). The Southwestern willow flycatcher is a small bird, approximately 5.75 inches in length, with a grayish green back and wings, whitish throat, light grey olive breast, and pale yellowish body. Two white wing bars are visible. The upper mandible is dark, the lower light. The most distinguishable taxonomic characteristic of the Southwestern willow flycatcher is the absent or faintly visible eye ring. The Southwestern willow flycatcher can only be positively differentiated in the field from other species of its genus by its distinctive "fitzbew" song.

Southwestern willow flycatchers nest in riparian habitat characterized by dense stands of intermediate sized shrubs or trees. Most Southwestern willow flycatcher nests are located in the fork of a shrub or tree from four to 25 feet above the ground (Unitt 1987; Sogge *et al.*, 1997a). These trees are either in or adjacent to soils that are either saturated or have surface water (Phillips *et al.*, 1964; Muiznieks *et al.*, 1994, McKernan 1998). The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian habitat, catching insects in the air or gleaning them from the surrounding foliage. It also forages along water edges, backwaters, and sandbars adjacent to nest sites. Details on specific prey items can be found in Drost *et al.*, (1998). On the Lower Colorado River, Southwestern willow flycatchers begin arriving on breeding territories in early May and continue to be present until August, with some records into early September (McKernan, 1998). Recent studies have documented nest building as early as May 1 (McKernan 1997) and fledging dates as late as September 9 (McKernan 1998).

A long-distance migrant, the Southwestern willow flycatcher winters in Mexico from Nayarit and southwestern Oaxaca south to Panama and possibly extreme northwestern Columbia and migrates widely through the southern United States occurring as a regular migrant south to the limits of the wintering range (Peterson 1990; Sogge *et al.*, 1997a, AOU 1998). Recent field studies in Costa Rica by Koronkiewicz and Whitfield (1999)

and studies of museum specimens by Phil Unitt (1999) collaborate previous information on the species' range. One specimen of willow flycatcher captured in Costa Rica during the winter of 1999 was banded at the Ash Meadows National Wildlife Refuge (NWR) in southern Nevada in July 1998 (Koronkiewicz and Whitfield 1999). The Ash Meadows NWR is within the identified breeding range of this southwestern subspecies and thus the capture in Costa Rica is the most recent confirmed wintering site of *E.t. extimus*. Breeding range for the species as a whole extends as far south as northern Sonora, and northern Baja California (AOU 1998) and north into Canada.

Breeding range for the southwestern subspecies of the willow flycatcher, *E. t. extimus*, extends from extreme southern Utah and Nevada, through Arizona, New Mexico, and southern California, but records from west Texas and extreme northern Baja California and Sonora, Mexico remain lacking to date (Unitt 1987). Molina (1998) observed the species in exotic plantings in the El Golfo de Santa Clara fishing village, and in the saltcedar-mesquite-acacia woodland corridor along the pozos near El Doctor in 1997. The species has also been documented at El Doctor wetlands, Colorado River delta, Sonora, Mexico June 7 and 8, 1999 (Hinojosa-Huerta, 2000). These sighting confirm the area is used for migration, but does not confirm breeding. The presence of the subspecies after June 15 is required to confirm breeding (Sogge *et al.*, 1997; Braden and McKernan 1998). A survey for southwestern willow flycatcher was conducted on the Copopah Indian Reservation near Yuma, Arizona in 2000. Twenty-six birds were detected on May 22 and June 6, 2000, and none later. It was concluded the riparian habitat on the Reservation was being used as a stopover area during the migration (Garcia-Hernandez, *et al.*, 2000).

The majority of Southwestern willow flycatchers found during the past five years of surveys on the Lower Colorado River have been found in saltcedar, *Tamarix ramosissima*, or a mixture of saltcedar and native cottonwood and willow, especially Gooddings willow, *Salix gooddingii*, coyote willow, *S. exigua* and Fremont cottonwood, *Populus fremontii*. Based on available information at the time of this writing, aside from this general description, no clear distinctions can be made based on perennial species composition or foliage height profiles, as to what constitutes appropriate southwestern willow flycatcher habitat. Due to the difficulty in determining the presence of this species in dense habitat, their presence should not be ruled out until surveys have been conducted if habitat meeting the general description given above is present.

Historically, the Southwestern willow flycatcher was widely distributed and fairly common throughout its range, especially in southern California and Arizona (Unitt 1987; Schlorff 1990). Nest and egg collections by Herbert Brown suggest that the Southwestern willow flycatcher was a common breeder along the lower Colorado River near Yuma in 1902 (Unitt 1987).

Grinnell (1914) also believed that the Southwestern willow flycatcher bred along the lower Colorado River due to the similarities in habitat between the lower Colorado

River and other known breeding sites. He noted the abundance of Southwestern willow flycatchers observed in the willow association and possible breeding behavior. However, the date of his expedition corresponds more to the migration season of the Southwestern willow flycatcher with only a small overlap with the beginning of the breeding season.

In 1993, the Service estimated that only 230 to 500 nesting pairs existed throughout its entire range (58 FR 39495). However, since extensive surveying has been implemented, this number has likely increased, especially on the lower Colorado River where the species was thought to have been extirpated (Hunter *et al.*, 1987b; Rosenberg *et al.*, 1991; McKernan and Braden 1999). Sixty-four nesting attempts were documented on the lower Colorado River from southern Nevada to Needles, California in 1998 (McKernan and Braden 1999).

Several factors have caused the decline in Southwestern willow flycatcher populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agricultural and urban development, mining, road construction, and overgrazing (Phillips *et al.*, 1964; Johnson and Haight 1984; Unitt 1987; Rosenberg *et al.*, 1991; Sogge *et al.*, 1997a). The total acreage of riparian vegetation has changed little in the last 20 years (Anderson and Ohmart 1976; Younker and Anderson 1986), although there is less native vegetation and more non-native present (Rosenberg *et al.*, 1991). The most recent estimate of historical, potentially suitable willow flycatcher habitat as delineated from 1938 aerial photography from the Grand Canyon to Mexico is 89,203 acres (USBR 1999d). Only some portion of this potentially suitable habitat can be assumed to be suitable habitat for the flycatcher, as the microclimate and other factors required which existed at the time are undeterminable. The total amount of occupied habitat for willow flycatchers along the lower Colorado River in the United States is estimated to be slightly over 6,000 acres (USBR 1999). A certain amount of habitat that apparently has the necessary components to be utilized as breeding habitat is not always being used (McKernan and Braden, 1998). This could indicate that lack of breeding habitat may not be what is limiting the Southwestern willow flycatcher's population.

In December, 1998, biologists from the Bureau of Reclamation, San Bernardino County Museum, and the Upper Gulf of California and Colorado River Delta Biosphere Reserve conducted an aerial survey of the Rio Hardy and the Colorado River to determine potentially suitable Southwestern willow flycatcher breeding habitat. Results of this survey indicate suitable habitat is present in the vicinity of Campo Mosqueda and Cucapa El Mayor and San Luis, Sonora along the Rio Colorado. Southwestern willow flycatchers utilize dense riparian habitat with moist soil or standing water present. Large volume flood control releases and Gila River flood flows are the primary condition under which riparian habitats are established in the delta and a high ground water table is needed to maintain this habitat. Potential reductions in the frequency of excess flows below Morelos Dam resulting from the adoption of either the Basin States, Six States, California or Shortage Protection alternative could potentially reduce the

amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This, coupled with continued groundwater production in these areas, could affect the high groundwater table that is needed to maintain habitat used by the Southwestern willow flycatcher. However, Reclamation believes that groundwater recharge in these area is more a result of percolation induced by agricultural irrigation, drainage water and the more frequent but lower-volume excess flows that are attributable to unused water delivery orders (by users in the Lower Basin states) that make it past Morelos Dam. This belief, considered with the uncertainty associated with excess flows, led to Reclamation's determination that the adoption of interim surplus criteria may affect, but is not likely to adversely affect the Southwestern willow flycatcher.

3.16.5.5.6 Yuma Clapper Rail

Yuma clapper rails (*Rallus longirostris yumanensis*) are federally endangered. They are found in emergent wetland vegetation such as dense or moderately dense stands of cattails (*Typha latifolia* and *T. domingensis*) and bulrush (*Scirpus californicus*) (Eddleman 1989; Todd 1986). They can also occur, in lesser numbers, in sparse cattail-bulrush stands or in dense reed (*Phragmites australis*) stands (Rosenberg *et al.*, 1991). The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway *et al.*, 1993). Annual fluctuation in water depth and residual marsh vegetation are important factors in determining habitat use by Yuma clapper rails (Eddleman 1989).

Yuma clapper rails may begin exhibiting courtship and pairing behavior as early as February. Nest building and incubation can begin by mid-March, with the majority of nests being initiated between late April and late May (Eddleman 1989, Conway *et al.*, 1993). The rails build their nests on dry hummocks, on or under dead emergent vegetation and at the bases of cattail or bulrush. Sometimes they weave nests in the forks of small shrubs that lie just above moist soil or above water that is up to about 2 feet deep. The incubation period is 20-23 days (Ehrlich *et al.*, 1988, Kaufman 1996) so the majority of clapper rail chicks should be fledged by August. Yuma clapper rails nest in a variety of different micro habitats within the emergent wetland vegetation type, with the only common denominator being a stable substrate. Nests can be found in shallow water near shore or in the interior of marshes over deep water (Eddleman 1989). Nests usually do not have a canopy overhead as surrounding marsh vegetation provides protective cover.

Crayfish (*Procambarus clarki*) are the preferred prey of Yuma clapper rails. Crayfish were introduced into the lower Colorado River about 1934. This food source and the development of marsh areas resulting from river control such as dams and river management helped to extend the breeding range of the Yuma clapper rail. The original range of the Yuma clapper rail was primarily the Colorado River delta. The southernmost confirmed occurrence of Yuma clapper rail in Mexico was three birds

collected at Mazaltan, Sinaloa; Estero Mescales, Nayarit; and inland at Laguna San Felipe, Puebla (Banks and Tomlinson 1974).

Crayfish comprise as much as 95 percent of the diet of some Yuma clapper rail populations (Ohmart and Tomlinson 1977). Availability of crayfish may be a limiting factor in clapper rail populations and is believed to be a factor in the migratory habits of the rail (Rosenberg *et al.*, 1991). Eddleman (1989), however, has found that crayfish populations in some areas remain high enough to support clapper rails all year and that seasonal movement of clapper rails can not be correlated to crayfish availability.

One issue of concern with the Yuma clapper rail is selenium. Eddleman (1989) reported selenium levels in Yuma clapper rails and eggs and in crayfish used as food were well within levels that will cause reproductive effects in mallards. Rusk (1991) reported a mean of 2.24 ppm dry weight selenium in crayfish samples from six lower Colorado River backwaters from Havasu National Wildlife Refuge, near Needles, California to Mittry Lake, near Yuma, Arizona. Over the past decade, there has been an apparent two to five fold increase in selenium concentrations in crayfish, the primary prey species for the Yuma clapper rail (King *et al.*, 2000). Elevated concentrations of selenium (4.21- 15.5 ppm dry weight) were present in 95 percent of the samples collected from known food items of rails. Crayfish from the Cienega de Santa Clara in Mexico contained 4.21 ppm selenium, a level lower than those in the United States, but still above the concern threshold. Recommendations from this latest report on the subject conclude that if selenium concentrations continue to rise, invertebrate and fish eating birds could experience selenium-induced reproductive failure and subsequent population declines (King *et al.*, 2000).

Yuma clapper rail may be impacted by man-caused disturbance in their preferred habitat. In recent years the use of boats and personal watercraft has increased along the lower Colorado River. This has led to speculation that the disturbance caused by water activities such as those may have a negative impact on species of marsh dwelling birds.

This subspecies is found along the Colorado River from Needles, California, to the Gulf, at the Salton Sea and other localities in the Imperial Valley, California, along the Gila River from Yuma to at least Tacna, Arizona, and several areas in central Arizona, including Picacho Reservoir (Todd 1986; Rosenberg *et al.*, 1991). In 1985, Anderson and Ohmart (1985) estimated a population size of 750 birds along the Colorado River north of the International Boundary. The Service (1983) estimated a total of 1,700 to 2,000 individuals throughout the range of the subspecies. Based on call count surveys, the population of Yuma clapper rail in the United States appears to be holding steady (Service, Phoenix, Arizona, unpublished data). Due to the variation in surveying over time, these estimates can only be considered the minimum number of birds present (Eddleman 1989; Todd 1986).

The range of the Yuma clapper rail has expanded in the past 25 years and continues to do so (Ohmart and Smith 1973; Monson and Phillips 1981; Rosenberg *et al.*, 1991,

SNWA 1998, McKernan 1999), so there is a strong possibility that population size may increase. Yuma clapper rails are known to expand into desired habitat when it becomes available. This is evidenced by the colonization of the Finne-Ramer habitat management unit in Southern California. This unit was modified to provide marsh habitat specifically for Yuma clapper rail and a substantial resident population exists there. There is also recent documentation of the species in Las Vegas Wash, Virgin River and the lower Grand Canyon (SNWA 1998; McKernan 1999).

A substantial population of Yuma clapper rail exists proximate to the Colorado River delta in Mexico. Eddleman (1989) estimated a total of 450 to 970 Yuma clapper rails were present there in 1987. The birds were located in the Cienega, Sonora, Mexico (200-400 birds), along a dike road on the delta proper (35-140 birds), and at the confluence of the Rio Hardy and Colorado River (200-400 birds). Piest and Campoy (AGFD) detected a total of 240 birds responding to taped calls in the Cienega. From these data, they estimate a total population of around 5,000 rails in the approximately cattail habitat the Cienega. Data from 1999 estimated the clapper rail population in the Cienega at 6400.

Yuma clapper rail were thought to be a migratory species, the majority of them migrating south into Mexico during the winter, with only a small population resident in the United States during the winter. Eddleman (1989) concluded the Yuma clapper rail was not as migratory as once thought and estimated approximately 70 percent remained in or near their home range during the winter.

A Recovery Plan was implemented in 1983 for the Yuma clapper rail. The criteria for downlisting of the species states there must be a stable breeding population of 700-1000 individuals for a period of 10 years. Other goals to be met include:

- Clarifying the breeding and wintering status in Mexico.
- Obtaining an agreement with Mexico for management and preservation of the species.
- Development of management plans for federal and state controlled areas where the rails are known to breed.

Written agreements are made with federal and state agencies to protect sufficient wintering and breeding habitat to support the proposed population numbers.

As of 1994 not all of the above recovery actions had been met, and the Yuma clapper rail remains classified as endangered. The recovery goals are currently being clarified by the Service based on information provided by rail experts in 1999.

Yuma clapper rail use dense stands of cattail marsh habitat in the delta. The currently known populations of Yuma clapper rail in Mexico are found in areas supported

primarily by agricultural drainage water and would therefore, not be affected by potential reductions in excess flows available to Mexico as a result of the adoption of surplus criteria. Therefore, Reclamation determined that the Yuma clapper rail would not be affected by implementation of any of the interim surplus alternatives.

3.16.5.5.7 Yellow-billed Cuckoo

The Yellow-billed cuckoo is proposed for listing under the Endangered Species Act. Cuckoos are riparian obligates, found along the lower Colorado River in mature riparian forests characterized by a canopy and mid-story of cottonwood, willow and saltcedar, with little ground cover (Haltermann 1998). Within the area of interest, cuckoos occur during the breeding season from interior California and the lower parts of the Grand Canyon, and Virgin River delta in southern Nevada (McKernan 1999) south to southern Arizona, Baja California, Chihuahua, Choahuila, Nuevo Leon, and Tamaulipas and have been recorded breeding as far south as Yucatan. The species winters in the southern United States, and from northern South America to Northern Argentina (AOU 1998, Hughes 1999). Cuckoos are largely insectivorous, with cicadas, (*Diceroprocta apache*) comprising 44.6 percent of their diet on the Bill Williams River National Wildlife Refuge (Halterman 1998). The Bill Williams River is a tributary of the lower Colorado River near Parker Dam, Arizona. The lower 10 miles of this tributary is designated as the Bill Williams River National Wildlife Refuge, comprised of a large expanse of native cottonwood and willow habitat interspersed with saltcedar. This area is believed to contain the largest cuckoo population in the lower Colorado River Valley.

In February 1998, the western subspecies of the Yellow-billed cuckoo, *C. a. occidentalis*, was petitioned for listing under the ESA. The Service determined that the petition presented substantial scientific or commercial information to indicate that the listing of the species may be warranted (Service 2000). Surveys for this species were conducted throughout Arizona in 1998 and 1999 (Corman and Magill 2000), and have been conducted on the Bill Williams River NWR, beginning in 1993 (Halterman 1994). In 2000, surveys have been expanded into southern Nevada and also include the Bill Williams River and Alamo Lake in Arizona.

As presented in Table 3.16-4, the numbers of cuckoos detected have fluctuated widely since surveying began in 1993 on the Bill Williams River. In 1997, on the Kern River in California, numbers of cuckoos detected declined in a similar manner as that seen on the Bill Williams River during the same time period, 1994-1997. On the Kern River, cuckoos detected declined from 14 pairs in 1996 to six pairs in 1997 (Halterman 1998); on the Bill Williams, cuckoos detected declined from 26 pairs to 12 pairs. In 1990, numbers were back up on the Bill Williams, but down again in 1999. In other areas of the lower Colorado River in the United States, cuckoos have been detected as far south as Gadsden and Imperial National Wildlife Refuge (Corman and Magill 2000, McKernan 1999).

Table 3.16-4
Yellow-billed Cuckoos Survey Results

Survey Results BWRNWR	1993	1994	1997	1998	1999
Pairs Detected	22	26	12	20	6
Single Birds Detected	11	14	11	11	8
Nests Found	6	5	3	4	2
Date First Pair Encountered	June 25	June 27	June 20	June18	June 5

Without complete and standardized surveys, it can only be speculated that the birds are present in the Colorado River delta in Mexico. The range of this species includes the Colorado River delta (AOU, 1998).

Yellow-billed cuckoos utilize mature riparian habitat with some mid- and under-story present. Large volume flood control releases and Gila River flood flows are the only condition under which riparian habitats are established in the delta, and a high ground water table is needed to maintain this habitat. Potential reductions in the frequency of excess flows below Morelos Dam resulting from the adoption of either the Basin States, Six States, California or Shortage Protection alternative could potentially reduce the amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This, coupled with continued groundwater production in these areas, could affect the high groundwater table that is needed to maintain habitat used by the Yellow-billed cuckoo. However, Reclamation believes that groundwater recharge in these area is more a result of percolation induced by agricultural irrigation, drainage water and the more frequent but lower-volume excess flows that are attributable to unused water delivery orders (by users in the Lower Basin states) that make it past Morelos Dam. This belief, combined with the uncertainty associated with excess flows, led to Reclamation's determination that the adoption of interim surplus criteria may affect, but is not likely to adversely impact the Yellow-billed cuckoo.

3.16.5.5.8 California Black Rail

California black rail (*Laterallus jamaicensis coturniculus*) is a federal species of concern and is protected by the state of California as a threatened species. Black rails are most often found in shallow salt marshes, but also utilize freshwater marshes, wet meadow-like areas and riparian habitat along rivers. Both males and females of this species exhibit slate black plumage with narrow, white barring on the back and flanks and a chestnut nape with a very short tail and a small black bill. Juveniles look much the same as adults, but their eyes are brown or olive rather than red like those of adults. Full grown birds measure about five to six inches in length.

The life history and status of the California black rail are poorly known (Wilbur 1974, Evens *et al.*, 1991), due to its secretive nature and tendency to inhabit densely vegetated marshes. The preferred habitat of the California black rail is characterized by minimum

water fluctuations that provide moist surfaces or very shallow water, gently sloping shorelines, and dense stands of marsh vegetation (Repking and Ohmart 1977). California black rails are most often found in areas where cattails (*Typha* sp.) and California bulrush (*Scirpus californicus*) are the predominant plant species (Rosenberg *et al.*, 1991). While California black rails are more commonly associated with cattail and bulrush, habitat structure as described above was more effective than plant composition in predicting California black rail use of habitat. Water depth appeared to be a limiting factor, as the California black rails prefer shallow water (Flores and Eddleman 1995). The breeding season along the lower Colorado River extends from April through July (Flores and Eddleman 1995). California black rails eat mainly aquatic insects and some seeds (Ehrlich 1988, Rosenberg *et al.*, 1991, Kaufmann 1996).

This subspecies of California black rail occurs along the California coast from Tomales Bay in Marin County, south to San Diego and extreme northern Baja California and Veracruz. It also occurs in interior California around the Salton Sea and along the Colorado River from Imperial National Wildlife Refuge south to the International Boundary (Peterson 1990; Rosenberg *et al.*, 1991, AOU 1998). The species has also been recorded as recently as 1997 at the Bill Williams River National Wildlife Refuge and at Havasu National Wildlife Refuge. Historically, the California black rail primarily occurred along the California coastline. In the mid-1970s, an estimate of between 100 and 200 individuals was given for the area between Imperial National Wildlife Refuge and Mittry Lake, Arizona (Repking and Ohmart 1977). No quantitative data are yet available on the current populations of the California black rail along the lower Colorado River or in the Colorado River delta area, although the species is present in both areas. Surveys are currently underway on the Lower Colorado River between Havasu National Wildlife Refuge and Yuma, Arizona. Various agencies, including BLM and the Service, survey California black rail concurrently during surveys for the Yuma clapper rail.

California black rails utilize very shallow marshes containing cattail and bulrush and are sensitive to small changes in water levels. Some surface water is necessary for their presence to occur. Like the Yuma clapper rail, they are primarily found in areas supported by agricultural drainage water and would not be affected by the potential reduction in the frequency of occurrence of excess flows that may result from the adoption of interim surplus criteria. Therefore, Reclamation believes the California black rail will not be affected by implementation of any of the interim surplus alternatives.

3.16.5.5.9 Elf Owl

The Elf owl (*Micrathene whitneyi*) is listed as endangered species by the state of California. The Elf owl is near the limit of its northwestern (central Riverside County, California) range along the Colorado River (AOU 1998,) and, as such, has never been abundant here (Rosenberg 1991). However, declines associated with loss of trees containing suitable cavities for nesting and loss of appropriate foraging habitat are

indicated (Rosenberg 1991). Elf Owls utilize abandoned woodpecker cavities or natural cavities for nesting. Declines in populations of woodpeckers on the lower Colorado River have been documented as well (Rosenberg 1991). In other parts of its range, namely central Arizona, saguaro cacti are more often used by Elf owls than on the lower Colorado River. Although saguaros are utilized along the Colorado River to some degree (as well as cottonwood, willow and mesquites), this cacti species is at its northwestern range, not extending further north than Fort Mojave, Arizona on the river. Therefore, it is less abundant in the Mohave Desert than in the Sonoran Desert.

To the south in Mexico, the winter range of Elf owls is from southern Sinaloa, Michoacan, Morelos and Guerrero, Pueblo and northwestern Oaxaca (AOU 1998). Breeding occurs in Coahuila and Nuevo Leon south to Sonora, Guanajuato and Puebla and in southern Baja California (AOU 1998). Elf owls have been documented during breeding season as far south as Picacho, Imperial Co., California as recently as 1998 (McKernan 1999). Recent field documentation of breeding for this species in the Colorado River delta are not available at this time. However, there is suitable habitat present there (Briggs and Cornelius 1998 Glynn 1999), and similar species, such as the great horned owl, have been recently documented there (Hinojosa-Huerta, 2000). As with the willow flycatcher, if suitable habitat is present, the presence of the species should not be ruled out until adequate surveys have been conducted.

Elf owls utilize mature riparian habitat with trees large enough to contain either natural cavities or cavities excavated by woodpeckers. Large volume flood control releases and Gila River flood flows are the only conditions under which riparian habitats are established in the delta and a high ground water table is needed to maintain this habitat. Potential reductions in the frequency of excess flows below Morelos Dam resulting from the adoption of either the Basin States, Six States, California or Shortage Protection alternative could potentially reduce the amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This, coupled with continued groundwater production in these areas, could affect the high groundwater table that is needed to maintain habitat used by the Elf owl. However, Reclamation believes that groundwater recharge in these area is more a result of percolation induced by agricultural irrigation, drainage water and the more frequent but lower-volume excess flows that are attributable to unused water delivery orders (by users in the Lower Basin states) that make it past Morelos Dam. This belief, combined with the uncertainty associated with excess flows, led to Reclamation's determination that the adoption of interim surplus criteria is not likely to adversely impact the Elf owl.

3.16.5.5.10 Bell's Vireo

Bell's vireo (*Vireo bellii arizonae*) is protected as an endangered species by the state of California. It is a small, insectivorous grayish to greenish-yellow bird is found in riparian habitat along the lower Colorado River and its tributaries in dense brush, including willow, cottonwood, mesquite and saltcedar. In the vicinity of the lower

Colorado River, the species breeds from interior California, southern Nevada and northwestern and east-central Arizona to northern Baja California, south through Sonora, southern Durango, Zacatecas, and southern Tamaulipas. During winter, it can be found as far south as north-central Nicaragua (AOU 1998). Bell's vireos experienced a decline in southern California and throughout the lower Colorado River beginning in the 1950s. Between 1974-1984, breeding was documented at only a few locations on the river, all north of Cibola NWR (Rosenberg *et al.,* 1991). Loss of habitat due to extensive flooding in 1983 is thought to have contributed to this decline. Stable populations in other parts of its range, including northern Mexico, prevented the species from being listed as endangered after being proposed in 1981 (Rosenberg *et al.,* 1991).

Without standardized surveys, it is difficult to determine the species' current abundance. The species appears to be recovering from previous lows as its presence has been documented recently as far north as Meadow Valley Wash and the lower Virgin River in southern Nevada and below Imperial Dam to the south (McKernan 1999) and is one of the most frequently heard species throughout the area. Habitat does exist across the border in Mexico similar to what is utilized by this species in the United States and observations of this species there confirm its presence during the breeding season (Hinojosa-Huerta, 2000).

Bell's vireos utilize mature riparian habitat with dense saltcedar, mesquite cottonwood and willow stands present. Large volume flood control releases and Gila River flood flows are the only conditions under which riparian habitats are established in the delta and a high ground water table is needed to maintain this habitat. Potential reductions in the frequency of excess flows below Morelos Dam resulting from the adoption of either the Basin States, Six States, California or Shortage Protection alternative could potentially reduce the amount of water available for groundwater recharge in the areas adjacent to the main channel of the Colorado River over an extended period of time. This, coupled with continued groundwater production in these areas, could affect the high groundwater table that is needed to maintain habitat used by the Bell's vireo. However, Reclamation believes that groundwater recharge in these area is more a result of percolation induced by agricultural irrigation, drainage water and the more frequent but lower-volume excess flows that are attributable to unused water delivery orders (by users in the Lower Basin states) that make it past Morelos Dam. This belief combined with the uncertainty associated with excess flows, led to Reclamation's determination that the adoption of interim surplus criteria may affect but is not likely to adversely impact the Bell's vireo.

3.16.5.5.11 Clark's Grebe

Clark's grebe (*Aechmophorus clarkii*) is a species of special concern to the state of– Arizona. Extensive knowledge of this species in the Colorado River delta in Mexico is not available, so any speculation on its abundance and status there is based on known available habitat only. Clark's grebes utilize marshes, lakes and bays with emergent

vegetation and can also be found on inland reservoirs and rivers (AOU 1998, Kaufman 1996, Rosenberg 1991). In the area of interest, the species is resident year round in Mexico south to Guerrero and western Puebla, and north of Mexico on lakes that do not freeze in winter, and winters from central California south to southern Baja California (AOU 1998). Clark's grebes have been documented at the Cienega de Santa Clara (Hinojosa-Huerta, 2000). The species is present during winter on the lower Colorado River and has been documented nesting in cattail marshes on the lower Colorado River at Havasu National Wildlife Refuge, near Needles, California in recent years (M. Connolly Havasu National Wildlife Refuge, pers.comm).

Threats to this species include recreation during breeding, as increased boating activity can swamp nests. In addition, as with other fish-eating species on the river, bioaccumulation of selenium in grebes is a potential threat both in the United States and in Mexico (King *et al.*, 2000).

Clark's grebes utilize marsh habitat for nesting and some surface water is needed to maintain this habitat. They also require open water and a prey base of small fish and crustaceans for foraging. Like the Yuma clapper rail, they are primarily found in areas supported by agricultural drainage water and would not be affected by potential reductions in the frequency of occurrence of excess flows that may result from the adaptation of the interim surplus criteria. These factors led Reclamation to determine that the Clark's grebe will not be affected by implementation of any of the interim surplus alternatives.

3.17 SUMMARY OF ENVIRONMENTAL COMMITMENTS

As discussed in this chapter, impacts are associated with changes in the difference between probabilities of occurrence for specific resource issues under study when comparing the action alternatives to baseline conditions. Reclamation has determined that most of the potential impacts identified are not of a magnitude that would require specific mitigation measures to reduce or eliminate their occurrence because the small changes in probabilities of occurrence are within Reclamation's current operational regime and authorities under applicable federal law. In recognition of potential effects that could occur under baseline conditions or with implementation of the interim surplus criteria alternatives under consideration, Reclamation has developed a number of environmental commitments, described below, that will be undertaken if interim surplus criteria are implemented. Some commitments are the result of compliance with specific consultation requirements.

3.17.1 WATER QUALITY

Reclamation will continue to monitor salinity and TDS the Colorado River as part of the ongoing Colorado River Basin Salinity Control Program to ensure compliance with the numeric criteria on the river as set forth in the Forum's 1999 Annual Review.

Reclamation will continue to participate in the Lake Mead Water Quality Forum and the Las Vegas Wash Coordination Committee as a principal and funding partner in studies of water quality in the Las Vegas Wash and Lake Mead. Reclamation is an active partner in the restoration of the Las Vegas Wash wetlands.

Reclamation is and will continue to acquire riparian and wetland habitat around Lake Mead and on the Lower Colorado River related to ongoing and projected routine operations.

Reclamation will continue to participate with the Nevada Division of Environmental Protection and Kerr-McGee Chemical Company in the perchlorate remediation program of groundwater discharge points along Las Vegas Wash which will reduce the amount of this contaminant entering the Colorado River.

Reclamation will continue to monitor river operations, reservoir levels and water supply and make this information available to the CRMWG, agencies and the public. See also Reclamation's website (http.//www.lc.usbr.gov and http.//www.uc.usbr.gov).

3.17.2 RIVERFLOW ISSUES

Reclamation will continue to work with the stakeholders in the AMP to develop an experimental flow program for the operations of Glen Canyon Dam which includes Beach/Habitat-Building-Flows (BHBFs) and is designed to protect, mitigate adverse impacts to and improve the values for which GCNP and GCNRA were established.

3.17.3 AQUATIC RESOURCES

Reclamation will initiate a temperature monitoring program below Hoover Dam with state and other federal agencies to document temperature changes related to baseline conditions and implementation of interim surplus criteria and assess their potential effects on listed species and the sport fishery. The existing hydrolab below Hoover Dam will be modified as necessary to provide this temperature data.

3.17.4 SPECIAL-STATUS SPECIES

Section 7 consultation is in progress and commitments will be identified in the ROD.

3.17.5 RECREATION

Reclamation is initiating a bathymetric survey of Lake Mead in fiscal year 2001 and will coordinate with the Lake Mead National Recreation Area to identify critical recreation facility elevations and navigational hazards that would be present under various reservoir surface elevations.

Reclamation will continue to monitor river operations, reservoir levels and water supply and make this information available to the CRMWG, agencies and the public. This operational information will provide the Lake Mead National Recreation Area and the Glen Canyon National Recreation Area with probabilities for future reservoir elevations to aid in management of navigational aids, recreation facilities, other resources, and fiscal planning.

Reclamation will continue its consultation and coordination with the Glen Canyon National Recreation Area and the Navajo Nation on the development of Antelope Point as a resort destination.

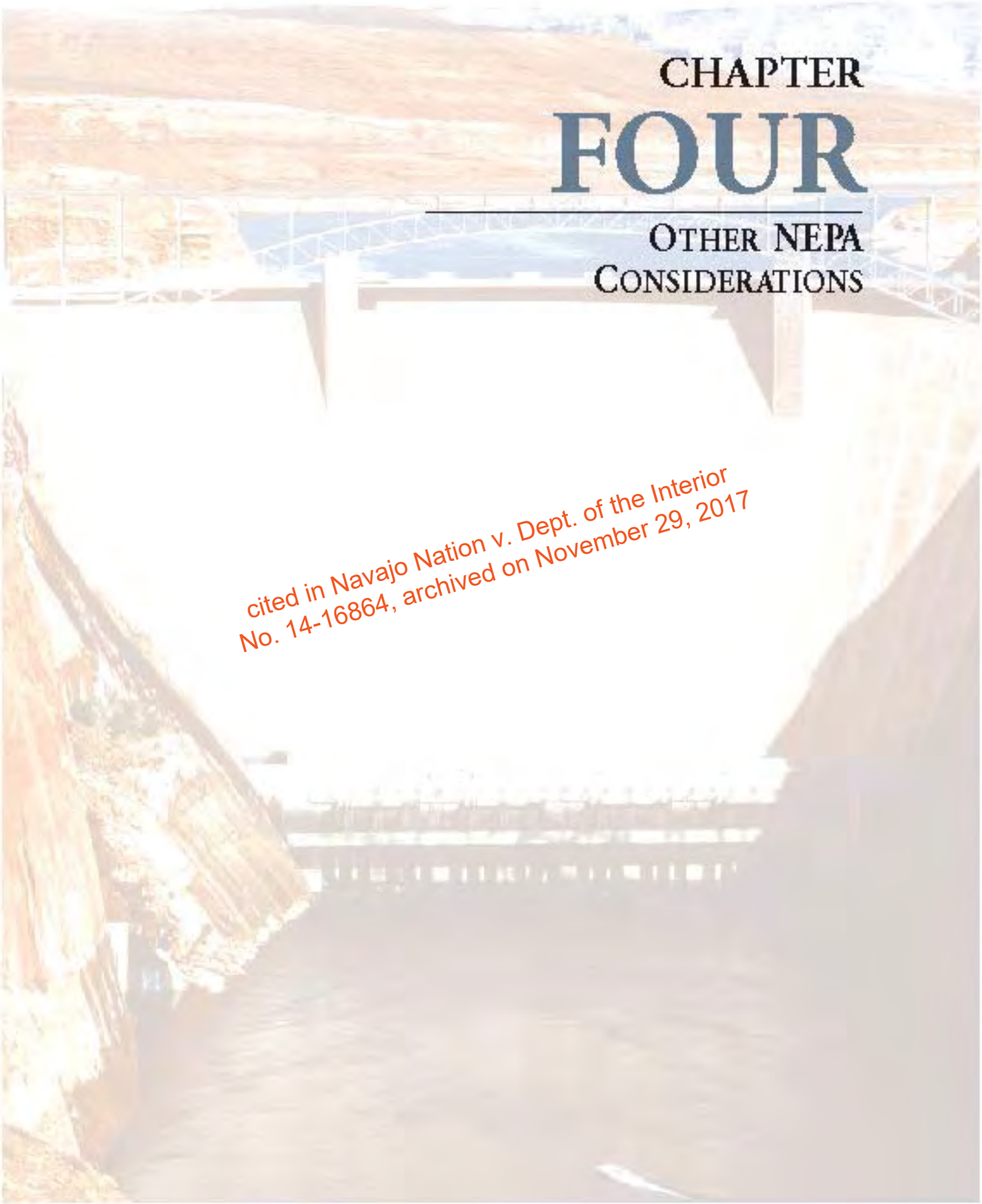
3.17.6 CULTURAL RESOURCES

Reclamation shall continue to consult and coordinate with the State Historic Preservation Officer, the Advisory Council on Historic Preservation (Council), Glen Canyon National Recreation Area, Lake Mead National Recreation Area, Tribes and interested parties with regard to the potential effects of the proposed action as required by Sections 106 and 110 of the National Historic Preservation Act following the

Council's recommended approach for consultation for the Protection of Historic Properties found at 36 CFR 800.

3.17.7 TRANSBOUNDARY IMPACTS

It is the position of the United States State Department through the United States Section of the International Boundary and Water Commission (USIBWC) that the United States does not mitigate for impacts in a foreign country. The United States will continue to participate with Mexico through the USIBWC Technical Work Groups to develop cooperative projects beneficial to both countries.



CHAPTER FOUR

OTHER NEPA CONSIDERATIONS

4 OTHER NEPA CONSIDERATIONS

4.1 INTRODUCTION

NEPA requires that the impacts to resources from proposed federal actions include the perspectives of cumulative impacts, relationship between short-term uses of the environment and long-term productivity, and irreversible and irretrievable commitments of resources. While an attempt was made to incorporate those considerations in the discussion for each resource, they are discussed further here in recognition of the emphasis they are given in NEPA and the CEQ Regulations.

4.2 CUMULATIVE IMPACTS

A cumulative impact is an impact that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

As discussed in Chapter 3, effects that could occur within the United States as a result of interim surplus criteria are each associated with potential changes in the probabilities for Lake Mead and Lake Powell surface elevation reductions and changes in Colorado River flows from Glen Canyon Dam to the SIB. Generally, other actions that could result in cumulative impacts when considered in tandem with the effects of interim surplus criteria (as identified in Chapter 3) have been incorporated into modeling of future system conditions. Such actions include future increases in consumptive use of Colorado River water in the Upper Division states, intrastate water transfers in the Lower Division states and various requirements and constraints applied to the operation of the Colorado River system.

The environmental effects of the various components of the CA Plan, including the various intrastate storage facilities (such as Cadiz, Hayfield/Chuckwalla, and Desert/Coachella projects), and the other related and ongoing actions are undergoing separate compliance. Where there is a federal nexus to actions in California, a combined CEQ/NEPA compliance document is being prepared.

Potential cumulative effects to the resources affected by surplus criteria were analyzed within the 100-year floodplain of the lower Colorado River from the full-pool elevation of Lake Powell to the Gulf of California in Mexico through year 2050. Only the issue area of “transboundary impacts” was identified as possibly experiencing cumulative effects.

No past, present, or reasonably foreseeable actions in the United States are expected to result in cumulative impacts to the issue area of transboundary impacts. In addition to

the direct and indirect effects on the physical and natural environment in Mexico from actions identified by Mexico that are discussed in Section 3.16, it is recognized that some future actions taken by Mexico may have a cumulative effect. Exactly what these actions are is not known at this time. Any impacts of these projects are the responsibility of Mexico.

In addition, Reclamation is consulting with the Service on potential adverse effects to species found in both Mexico and the United States. For potentially affected species found only in Mexico, Reclamation is consulting with the National Marine Fisheries Service. Concurrent with these consultations, Reclamation is also continuing dialog with Mexico, through the IBWC's Fourth Technical Work Group, to reach mutually agreeable solutions to address cumulative impacts.

4.3 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Because the implementation of interim surplus criteria is a management action that would require no direct physical change to the environment, for the purposes of this discussion, short-term uses of resources are limited to potential changes in the probability for certain environmental effects to occur as a result of changed system conditions. Also for the purposes of this discussion, long-term productivity refers to the benefits that would be realized during and following the period in which interim surplus criteria would be in place.

As stated in Section 1.1.3, Purpose of and Need for Action, the benefit sought by means of the interim surplus criteria alternatives consists of increasing the efficiency of the Secretary's annual decision-making process regarding the availability of Colorado River water. This would afford the mainstream users of this water a greater degree of predictability which would assist them in their water resources planning and operation.

The resources that may be affected in the short-term would be primarily those affected by lower reservoir levels. The effects of the interim surplus criteria on those resources would depend on the alternative selected for implementation. The Flood Control Alternative would result in insignificant changes in reservoir levels from baseline conditions. The other four alternatives would tend to cause lower average water levels than baseline conditions by 2016 and for a limited period of time thereafter. However, these alternatives would have a greater probability of surplus water than the Flood Control Alternative or baseline conditions through the year 2016. Long-term benefits that would be realized due to interim surplus criteria would include increased opportunities for making more efficient use of Colorado River water supplies.

4.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments are decisions affecting renewable resources such as soils, wetlands and waterfowl habitat. Such decisions are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at great expense or because they would cause the resource to be destroyed or removed.

The application of the interim surplus criteria would include reviews at five-year intervals to consider the workability of the criteria in light of the multiple purposes served by the operation of the Colorado River system, including environmental maintenance. Based on those reviews, interim surplus criteria could be revised or eliminated as needed. If California fails to meet its water conservation and management goals throughout the stipulated term of implementation of the criteria (through 2016), the Secretary may choose to terminate the interim criteria and revert to the 70R Strategy. Finally, after 2016, determinations of the availability of surplus will revert to the AOP process.

None of the resources assessed in this FEIS would experience a deterioration in condition such that the resource would be destroyed or removed as a result of implementation of interim surplus criteria or under the No Action Alternative. The Colorado River System may also reseat at any time in the future, due to high inflows, resulting in full reservoirs. There would be no construction of facilities needed to facilitate the Secretary's determination of surplus water under the criteria.

Irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used.

All of the resources assessed in the FEIS would continue to be available for production or use under any of the alternatives; however, application of the interim surplus criteria may result in a determination for any given year that surplus water is available from the Colorado River. That water could also have been determined to be surplus in the absence of interim surplus criteria through the AOP process. Although water is a renewable resource, the delivery of surplus water under all of the alternatives, including no action, would irretrievably commit (to beneficial consumptive uses) the water declared to be surplus, but authorized by the *Law of the River*.

CHAPTER FIVE

CONSULTATION & COORDINATION

5 CONSULTATION AND COORDINATION

5.1 INTRODUCTION

This chapter describes Reclamation's public involvement program and coordination with specific federal, state and local agencies, non-governmental organizations and the general public for the preparation of this FEIS.

5.2 GENERAL PUBLIC INVOLVEMENT ACTIVITIES

The public involvement program leading to this FEIS consisted essentially of two phases: project scoping and public hearings and public review of the DEIS.

5.2.1 PROJECT SCOPING

In 1999, Reclamation conducted a public scoping process that featured public scoping meetings to inform interested parties of the purpose and need for the development of interim surplus criteria, and to obtain public comment to assist in identifying the scope of the proposed action and environmental issues to be addressed in the DEIS. The scoping meetings were held in June 1999 in Las Vegas, Nevada; Phoenix, Arizona; Ontario, California; and Salt Lake City, Utah. The meetings were announced in *Federal Register* notices on May 18, 1999 and May 28, 1999, on Reclamation's Lower Colorado Region internet website and by a press release on May 28, 1999. The press release was mailed not only to the media but also to hundreds of federal, state and local agencies, non-governmental organizations and private citizens known to have an interest in Colorado River operations. The public was asked to identify any concerns about development and implementation of the interim surplus criteria.

Public comments in the form of letters to Reclamation (35 letters) and oral responses at the scoping meetings (eight presenters) expressed numerous concerns regarding the effect of the proposed interim surplus criteria on the future quantity of water available from the Colorado River, and other resource issues. Attachment R to this DEIS contains details of the scoping process and a digest of the public comments that resulted from the scoping process. Based on the scoping comments, Reclamation issued a Notice of Intent to prepare this DEIS in the *Federal Register* on December 7, 1999.

Reclamation also discussed the development of the proposed interim surplus criteria with various agencies and groups at their own regular meetings or at meetings set up by Reclamation. Included were Indian Tribes and Indian Communities having allocations of Colorado River water, Basin States water resource departments, various water agencies within the states, contractors for federal hydropower, environmental groups and water agencies of Mexico. The coordination activities with each agency or group are summarized below in this chapter. Table 5-1 in Section 5.8 lists the agencies and

organizations that were invited to such meetings by letter, and/or met with Reclamation regarding interim surplus criteria on other occasions.

5.2.2 PUBLIC REVIEW OF DEIS

The DEIS was distributed to interested federal, Tribal, state and local entities and members of the general public for a 60-day review when it was filed with EPA on July 7, 2000, and announced in the *Federal Register*. The DEIS was sent to 407 interested parties on Reclamation's mailing list, and a copy of the DEIS was made available for public viewing on Reclamation's Lower Colorado Region website. Reclamation conducted a public technical meeting at Las Vegas, Nevada on August 15, 2000, to provide information and answer questions regarding the modeling process for analysis in the DEIS. Between August 21 and August 24, 2000, Reclamation conducted public hearings on the DEIS in Ontario, California; Las Vegas, Nevada; Salt Lake City, Utah; and Phoenix, Arizona. Public comments from the hearings are noted in Volume III of this FEIS. The DEIS was available for public viewing on Reclamation's website (www.lc.usbv.gov). The FEIS is now available at the same website.

When the public review period closed on September 8, 2000, Reclamation had received 68 comment letters from the public, which are reproduced in Volume III of this FEIS. Individual comments from the public resulted in technical and editorial changes to the document. These included a change in the baseline operating strategy, better definition of Tribal water rights and diversions, inclusion of the Basin States Alternative and refinements in descriptions of alternatives and operational modeling results. Reclamation's response to each comment is included in Volume III.

After the DEIS was completed and ready for public review and comment, Reclamation received the document "Interim Surplus Guidelines, Working Draft" from the Seven Basin States (Seven States Proposal). Reclamation made a preliminary review of the specific surplus criteria in the information presented by the Basin States and made a preliminary determination that the criteria were within the range of alternatives and impacts analyzed in the DEIS. After its review of the Seven States Proposal, Reclamation published it in the *Federal Register* of August 8, 2000 for review and consideration by the public during the public review period for the DEIS.

5.3 FEDERAL AGENCY COORDINATION

5.3.1 NATIONAL PARK SERVICE

As noted in Section 1.1.5, NPS is a cooperating agency with Reclamation for the purpose of NEPA compliance for the interim surplus criteria, in recognition of its administration of national park and recreation areas along the Colorado River corridor. NPS staff participated in numerous meetings with Reclamation's project evaluation team and participated in internal document reviews as sections of the DEIS were being prepared. This facilitated close coordination with the NPS regarding resources and

facilities potentially affected and the nature of the effects. The NPS offices involved in these activities are those at the GCNRA, Grand Canyon National Park and the LMNRA, under the coordination of the office at the GCNRA.

5.3.2 UNITED STATES SECTION OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION

As noted in Section 1.1.5, the United States Section of the International Boundary and Water Commission (USIBWC) is a cooperating agency with Reclamation for the purposes of NEPA compliance for the interim surplus criteria, in recognition of its administration of Treaty obligations with Mexico. As such, USIBWC staff participated in numerous meetings with Reclamation's project evaluation team and participated in internal document reviews as sections of the DEIS were being prepared. This facilitated close coordination with the USIBWC in developing information needed for this FEIS and in Reclamation's participation in the consultation with Mexico as discussed below in Section 5.7. The USIBWC head office in El Paso, Texas was directly involved.

5.3.3 UNITED STATES BUREAU OF INDIAN AFFAIRS

The Bureau of Indian Affairs (BIA) administers programs to promote Tribal economic opportunity and to protect and improve Indian Trust Assets. The BIA assisted Reclamation with the Tribal consultation described in Section 5.2 and generally served in an advisory capacity to the Tribes. Through letters of comment on the DEIS, the BIA further amplified Tribal concerns regarding Colorado River operations and the interim surplus criteria.

5.3.4 UNITED STATES FISH AND WILDLIFE SERVICE INCLUDING ENDANGERED SPECIES ACT COMPLIANCE

Under Section 7(a)(2) of the Endangered Species Act (ESA), 16 U.S.C. δ 1536 (a)(2), each federal agency must, in consultation with the Secretary (either the Secretary of Commerce through the National Marine Fisheries Service (NMFS) or the Secretary of the Interior through the U.S. Fish and Wildlife Service (Service), insure that any discretionary action authorized, funded or carried out by the agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat. To assist agencies in complying with the requirements of Section 7(a)(2), ESA's implementing regulations set out a detailed consultation process for determining the biological impacts of a proposed discretionary activity. The consultation process is described in regulations promulgated at 50 CFR δ 402.

Adoption of specific interim surplus criteria by the Secretary is a discretionary federal action and is, therefore, subject to compliance with the ESA. On May 22, 2000, Reclamation provided the Service with a memorandum identifying listed or proposed species and designated critical habitat that may be present in the action area. The

Service provided a response to Reclamation on June 5, 2000, which concurred with Reclamation's list and added two species: Bald Eagle and Desert Pupfish. This information was used to assess potential effects of the proposed interim surplus criteria. Copies of this correspondence are in Attachment S.

Reclamation has prepared a BA which addresses the effects of both interim surplus criteria and the California Water Transfers (USBR, 2000), to reduce the consultation time frame on these two independent operational actions on the lower Colorado River. The BA and memorandum requesting formal consultation were mailed to the Service on August 31, 2000.

The action area for the BA identified above is the 100-year floodplain of the Colorado River to the SIB and the full pool elevations of lakes Mead, Mohave and Havasu. Implementation of the interim surplus criteria is not expected to affect any listed species upriver of Lake Mead (full pool elevation) nor impact implementation of any provisions of the existing BO on the operation of Glen Canyon Dam. Within the United States, implementation of interim surplus criteria is not anticipated to affect any listed species in areas beyond the 100-year floodplain of the lower Colorado River and the full pool elevations of lakes Mead, Mohave and Havasu. Consultation with the Service is in progress and the results of the consultation will be identified in the ROD.

Preliminary evaluations of the effects of adopting interim surplus criteria on listed species which may be present in the river corridor below Glen Canyon Dam led to the conclusion that there would be no affect. More recent output, resulting from refinement of the model used to predict future dam operations and riverflows, indicated that there would be a minor change in the frequency with which flows recommended by the 1995 biological opinion would be triggered, but that such changes would not adversely affect any listed species between Glen Canyon and Lake Mead. Reclamation is consulting with the Service on these changes.

Reclamation is also consulting with the Service regarding special status species in Mexico, which are discussed in Section 3.16. To facilitate consultation, Reclamation prepared a BA Supplement addressing the potential effects of interim surplus criteria (USBR, 2000), along the Colorado River corridor in Mexico from the SIB to the Sea of Cortez. Consultation is in progress and the results of the consultation will be identified in the ROD.

5.3.5 NATIONAL MARINE FISHERIES SERVICE

The NMFS administers programs that support the domestic and international conservation and management of living marine resources. Under Section 7(a)(2) of the ESA, NMFS is the responsible federal agency for consultation on special status marine species. Reclamation consulted with NMFS regarding the special status fish at the upper end of the Sea of Cortez, which are discussed in Section 3.16. The consultation was facilitated by a BA supplementing the BA described in Section 5.3.4 (USBR,

2000). Consultation is in progress and the results of the consultation will be identified in the ROD.

5.3.6 NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE

As mentioned in Section 3.13 for Cultural Resources, Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires all federal agencies to take into account the effects of their actions on historic properties, and to afford the Advisory Council on Historic Preservation (Council) a reasonable opportunity to comment when an action will have an effect on historic properties. The Council's recommended approach for consultation for the Protection of Historic Properties is found in 36 CFR 800 (FR Vol. 64, No. 95, May 18, 1999, pages 27071-27084).

The first step of the Section 106 process, as set forth in 36 CFR 800.3(a), is for the Agency Official to determine whether the proposed federal action is an undertaking as defined in §800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects to historic properties. Reclamation has determined development and implementation of interim surplus criteria meets the definition of an undertaking, but an undertaking that is without potential to affect historic properties. Reclamation's determination and the rationale for its decision are documented in Section 3.13. Per 36 CFR 800.3(a)(1), if the undertaking does not have the potential to cause effects on historic properties, the agency official has no further obligations under Section 106 or this part and Reclamation has fulfilled its responsibilities to take into account the effects of the development and implementation of interim surplus criteria on historic properties.

The Nevada State Historic Preservation Officer (SHPO) submitted written comments on the cultural resources section of the DEIS. The SHPO has indicated they do not agree with Reclamation's position in the DEIS that development and implementation of interim surplus criteria are undertakings without potential to affect historic properties. Therefore, compliance with the consultation requirements of the NHPA is not necessary.

The Nevada SHPO has stated that their opportunity to comment on effects to historic properties has been precluded by Reclamation and Interior's finding, and have asked that the matter be referred to the Council. Under the implementing regulations for Section 106, when there is a disagreement between an agency and a SHPO concerning the effect of an undertaking, the matter must be referred to the Council for comment and resolution. Reclamation believes the Council will agree with the Nevada SHPO that Section 106 compliance is necessary for this proposed action. Reclamation's position is that this is not an action requiring Section 106 compliance, but more appropriately falls under Section 110 of the NHPA.

Reclamation has prepared a memorandum discussing this issue and has forwarded it to the Council for review and further consultation.

5.4 TRIBAL CONSULTATION

As discussed in Section 3.14, Indian Trust Assets, Reclamation has been coordinating river operations with the Indian Tribes and Communities who have entitlements to or contracts for Colorado River water, and those that may be affected by the proposed action. Representatives of various Tribes attended the scoping meetings in May 1999, and some provided Reclamation with written comments on the proposal for interim surplus criteria. Beginning in May 1999, Reclamation has had numerous meetings with the various Tribes who have an interest in the implementation of the interim surplus criteria. The Tribes and Communities fall generally into four groups: 1) the Colorado River Basin Indian Tribes (Ten Tribes Partnership) who have diversion rights from the Colorado River mainstream and various tributaries; 2) the Tribes and Communities of central Arizona that are served by CAP facilities; 3) the Tribes in the Coachella Valley Consortium of Mission Indians; and 4) other Tribes or Indian Communities who do not have a Colorado River water entitlement but nevertheless have an interest in the availability and distribution of Colorado River water. The individual Tribes and Indian Communities in each of these groups are listed on Table 5-1 at the end of this chapter.

A primary concern of the Ten Tribes Partnership was that Tribal water rights be clearly acknowledged and that the diversion point(s) for each Tribe be included in the operational model so as to more accurately reflect Tribal diversions in the modeling. Other concerns included over-reliance on unused Tribal water allocations by non-tribal diverters and Lake Powell water level fluctuations with respect to resort development opportunity. Reclamation provided financial assistance to the Ten Tribes Partnership to assist the Tribes in cataloging their Colorado River depletion rights and conducting an active coordination process with Reclamation in connection with the interim surplus criteria. Using information provided by the Tribes, Reclamation added the diversion points to the model, as discussed in Sections 3.3 and 3.4.

5.5 STATE AND LOCAL WATER AND POWER AGENCIES COORDINATION

Since the May 18, 1999 *Federal Register* notice announcing the development of interim surplus criteria, Reclamation has had various discussions with state and local water and power agencies regarding the proposed action. However, development of surplus criteria has been the subject of discussions for many years prior to 1999. Reclamation meets regularly with representatives of the Basin States, Indian Tribes and Communities, environmental organizations and other stakeholders as part of the CRMWG. Reclamation coordinates the development of the AOP for the Colorado

River system through this group as required by federal law. It was through such coordination actions that Reclamation originally presented the alternative surplus strategies described in Section 2.2.1, Operating Strategies for Surplus Determination.

The Basin States provided Reclamation with projections of the future depletions of the Colorado River water anticipated by water agencies in each state. The Upper Colorado River Commission compiled Upper Basin depletions, and the Lower Division states compiled their respective depletions. The projections were used as input to Reclamation's operational modeling analysis, as discussed in Section 3.3.

Reclamation also conducted coordination with water agencies in southern California regarding the environmental documentation being prepared for various components of California's Colorado River Water Use Plan.

In the early summer of 2000, the seven Basin States acting as a group, independent from Reclamation, formulated the Seven States proposal for interim surplus criteria which they provided to Reclamation after the DEIS was prepared, as discussed above in Section 5.2.2. Letters of comment on the DEIS from some of the Basin States contained additional commentary on the draft proposal.

5.6 NON-GOVERNMENTAL ORGANIZATIONS COORDINATION

Several environmental organizations have expressed interest in the project and have attended one or more public and independent meetings with Reclamation. The Pacific Institute, representing a consortium of environmental organizations, submitted an interim surplus criteria proposal to Reclamation in February 2000, which is in Attachment G. As discussed in Section 2.2.3, the proposal included an additional allocation of water to Mexico for environmental purposes. The Pacific Institute's interest in the project and coordinating role among the other environmental groups contributed to the coordination with Reclamation by various other non-governmental organizations, which are cited on Table 5-1 at the end of this chapter. In addition, through the CRMWG and other mechanisms, Reclamation worked with the various non-governmental organizations during the NEPA process. Specifically, Reclamation met with members of the organizations noted in Table 5-1 at their request, to discuss environmental and technical issues.

5.7 MEXICO CONSULTATION

Pursuant to an international agreement for mandatory reciprocal consultations, the USIBWC has begun consultation with Mexico regarding the proposed interim surplus criteria. Reclamation has assisted USIBWC in conducting this consultation by providing information on the proposed interim surplus criteria and by participating in briefings with the Mexico Section of the IBWC and the Mexico National Water Commission. Meetings with representatives of Mexico were conducted in April and

May 2000, during which representatives of Mexico provided their concerns regarding the potential effects of the interim surplus criteria.

The USIBWC has prepared Terms of Reference for consultation with Mexico, which are contained in Attachment T, together with correspondence from Mexico during the scoping phase of the project. Coordination with Mexico during the DEIS review phase has consisted of several letters from the government of Mexico and public agencies in Mexico, which are reproduced in Volume III of the DEIS.

Discussion with Mexico took place on November 14, 2000 concerning comments from Mexico. There was understanding that the consultation with Mexico through IBWC in the form of technical working groups will continue a forum for technical discussion to carry out, in the context of international comity, joint cooperation projects in support of the Colorado River riparian ecology to the Gulf of California that could have a benefit to the United States and Mexico.

Executive Order 12114 instructs federal agencies to investigate the effects of federal actions in other countries. Reclamation has analyzed and documented the effects of the proposed interim surplus criteria on natural resources in Mexico. This analysis will provide an analytical tool for identifying those potential impacts that extend across the international border and affect Mexico's natural and physical environment. This approach is fully consistent with CEQ guidance on NEPA analyses for transboundary impacts, dated July 1, 1997. Detailed information on this analysis is addressed in Chapter 3.16.

5.8 SUMMARY OF COORDINATION CONTACTS

Table 5-1 lists the agencies and organizations with which Reclamation coordinated through meetings and other personal contacts during the scoping and preparation period of this FEIS.

Table 5-1
Participants With Reclamation Regarding The
Interim Surplus Criteria Environmental Impact Statement Process

Agency or Organization Invited to or Requesting Meetings	Meetings
Federal Agencies	
National Park Service – ***Cooperating Agency***	Various plan formulation and evaluation meetings
United States Section of the International Boundary and Water Commission – ***Cooperating Agency***	Various plan formulation and evaluation meetings; Briefings for Mexico
Bureau of Indian Affairs	5/26/99, 12/15/99, 1/21/00, 2/24/00, 8/30/00
Environmental Protection Agency	6/15/99, 8/30/00
U.S. Fish And Wildlife Service	Various Consultation Meetings on ESA Compliance
National Marine Fisheries Service	Consultation on Special Status Species in the Sea of Cortez, 10/12/00
Geological Survey	6/15/99, 8/15/00
Western Area Power Administration	6/15/99, 8/15/00
Tribal Coordination – Ten Tribes Partnership	
Chemehuevi Tribe	5/26/99, 6/15/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 8/4/00
Cocopah Indian Tribe	5/26/99, 6/15/99, 11/16/99, 2/15/99, 2/24/00, 2/25/00, 8/3/00
Colorado River Indian Tribes	5/26/99, 6/15/99, 11/16/1999, 12/15/99, 2/24/00, 2/25/00, 8/4/00
Fort Mojave Indian Tribe	5/26/99, 6/15/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 8/2/00
Jicarilla Apache Tribe	5/26/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00
Navajo Nation	5/26/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 9/27/00, 8/3/00
Northern Ute Tribe	5/26/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 8/17/00
Quechan Indian Tribe	5/26/99, 6/15/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 8/2/00
Southern Ute Indian Tribe	5/26/99, 11/16/19, 12/15/99, 2/24/00, 2/2500
Ute Mountain Ute Tribe	5/26/99, 11/16/19, 12/15/99, 2/24/00, 2/25/00, 8/3/00

Agency or Organization Invited to or Requesting Meetings	Meetings
Tribal Coordination –Tribes And Communities In Central Arizona	
Ak-Chin Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Mojave-Apache Tribe	5/26/99, 1/21/00, 8/3/00
Gila River Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Pasqua-Yaqui Tribe	5/26/99, 1/21/00
Salt River Pima-Maricopa Indian Community	5/26/99, 6/15/99, 1/21/00
San Carlos Indian Tribe	5/26/99, 6/15/99, 1/21/00, 8/3/00
Tohono O'Odham Tribe	5/26/99, 6/15/99, 1/21/00, 8/15/00, 8/3/00
Tonto Apache Tribe	5/26/99, 6/15/99, 1/21/00, 8/4/00
Yavapai-Apache Indian Community	5/26/99, 6/15/99, 1/21/00, 8/3/00
Yavapai-Prescott Indian Tribe	5/26/99, 6/15/99, 1/21/00
Tribal Coordination – Coachella Valley Consortium Of Mission Indians	
Agua Caliente Band of Cahuilla Indians	8/30/00, 9/6/00
Augustine Band of Mission Indians	[Contact attempted; DEIS sent]
Cabazon Band of Mission Indians	[Contact attempted; DEIS sent]
Morongo Band of Mission Indians	8/30/00
Torres-Martinez Desert Cahuilla Tribe	1/21/00, 8/30/00
Twenty-Nine Palms Band of Mission Indians	[Contact attempted; DEIS sent]
Tribal Coordination – Other Tribes	
Havasupai Indian Tribe	6/15/99, 5/26/99, 1/21/00
Hopi Tribe	6/15/99, 5/26/99, 1/21/00, 8/4/00
Hualapai Nation	6/15/99, 5/26/99, 1/21/00, 8/3/00
Kaibab Paiute Tribe	8/3/00
San Juan Southern Paiute Tribe	8/3/00
San Luis Rey Indian Water Authority	8/16/00
Zuni Indian Tribe	8/3/00

Agency or Organization Invited to or Requesting Meetings	Meetings
State And Local Water And Power Agencies	
Arizona Department of Water Resources	6/15/99, 12/16/99
Central Arizona Water Conservation District	6/15/99, 8/15/00
Coachella Valley Water District	6/15/99, 6/6/00, 8/15/00
Colorado River Board of California	6/15/99, 12/16/99, 6/6/00, 8/15/00,11/14/00
Colorado River Commission of Nevada	6/15/99, 12/16/99
Colorado River Water Conservation District	8/15/00
Colorado Water Conservation Board	12/16/99, 8/15/00
Utah Division of Water Resources	12/16/99
Imperial Irrigation District	6/15/99, 6/6/00, 8/15/00, 11/14/00
Las Vegas Valley Water District	6/22/99
Metropolitan Water District, California	6/15/99, 6/6/00, 8/15/00
New Mexico Interstate Stream Commission	12/16/99, 8/15/00
Office of the State Engineer, Wyoming	12/16/99, 8/15/00
Parker Valley Natural Resources Conservation District	12/16/99
Upper Colorado River Commission	6/15/99, 8/15/00
San Diego County Water Authority	8/15/00
Southern Nevada Water Authority	12/16/99, 8/15/00
Non-Governmental Agencies	
Center for Biodiversity	12/15/99, 6/8/00
Defenders of Wildlife	12/15/99, 8/15/00
Environmental Defense	12/15/99, 8/15/00
Glen Canyon Action Network	8/22/00
Pacific Institute	12/15/99, 8/15/00
Southwest Rivers	12/15/99, 8/15/00

Agency or Organization Invited to or Requesting Meetings	Meetings
Agencies of Mexico	
International Boundary and Water Commission, Mexico Section	4/12/00, 5/11/00, 5/12/00, 9/30/00, 11/9/00, 11/14/00
National Water Commission	4/12/00, 5/11/00, 5/12/00, 9/30/00, 11/9/00, 11/14/00
National Institute of Ecology	4/12/00, 9/30/00, 11/9/00, 11/14/00
Secretariat of Environment, Natural Resources and Fish	9/30/00, 11/14/00

5.9 FEDERAL REGISTER NOTICES

This section contains a compilation of the *Federal Register* notices issued to inform the public about the formulation of interim surplus criteria alternatives and the preparation and availability of the DEIS. Table 5.2 lists the *Federal Register* notices, which are presented following the table. In addition to the notices issued, additional notices are planned following the publication of this FEIS to announce its availability and the Secretary's ROD based on this FEIS.

Table 5-2
***Federal Register* Notices Regarding Interim Surplus Criteria**

Notice	Title
Volume 64, No. 95, Page 27008, May 18, 1999	Intent to Solicit Comments on the Development of Surplus Criteria for Management of the Colorado River and to Initiate NEPA Process.
Volume 64, No. 103, Page 29068, May 28, 1999	Public Meetings on the Development of Surplus Criteria for Management of the Colorado River and to Initiate NEPA Process
Volume 64, No. 234, Page 68373, December 7, 1999	Colorado River Interim Surplus Criteria; Notice of Intent to Prepare an Environmental Impact Statement
Volume 65, No. 131, Page 42028, July 7, 2000	Notice of Availability of a draft environmental impact statement and public hearings for the proposed adoption of Colorado River Interim Surplus Criteria
Volume 65, No. 149, Page 47516, August 2, 2000	Notice of revised dates for public hearings on the proposed adoption of Colorado River Interim Surplus Criteria
Volume 65, No. 153, Page 48531, August 8, 2000	Notice of public availability of information submitted on a draft environmental impact statement for the proposed adoption of Colorado River Interim Surplus Criteria (Colorado River Basin States: Interim Surplus Guidelines – Working Draft)
Volume 65, No. 185, Page 57371, September 22, 2000	Notice of Correction to published *Federal Register* Notice of Availability (Colorado River Basin States: Interim Surplus Guidelines – Working Draft)

MASSACHUSETTS

Middlesex County

Hosmer Homestead, 138 Baker Ave., Concord, 99000659

Worcester County

Gardner Uptown Historic District, Roughly along Central, Cross, Elm, Green. Glazier, Pearl and Woodland Sts., Gardner, 99000660

MISSOURI

Franklin County

New Haven Residential Historic District, Roughly along Wall St. and Maupin Ave., and bounded by Washington and Bates Sts., New Haven, 99000661

Lewis County

Gray, William, House (La Grange, Missouri MPS), 407 Washington, La Grange, 99000666
Hay, Dr. J.A., House (La Grange, Missouri MPS), 406 W. Monroe St., La Grange, 99000664
McKoon, John, House (La Grange, Missouri MPS), 500 W. Monroe St., La Grange, 99000665
Rhoda, Fred, House (La Grange, Missouri MPS), 200 S. Second St., La Grange, 99000662
Waltman, A.C., House (La Grange, Missouri MPS), 302 Lewis St., La Grange, 99000663

NEW HAMPSHIRE

Hillsborough County

Francestown Meetinghouse, Rte 136, Francestown, 99000667

Rockingham County

Little Boar's Head Historic District, Parts of, Atlantic Ave., Chapel Rd., Ocean Blvd., Sea Rd., and Willow Ave., North Hampton, 99000668

NEW YORK

Tompkins County

First Presbyterian Church of Ulysses, Main St., Trumansburg, 99000669

NORTH CAROLINA

Mecklenburg County

McNinch, Frank Ramsay, House, 2727 Sharon Ln., Charlotte, 99000670

OKLAHOMA

Craig County

First Methodist-Episcopal Church, South, 314 W. Candian Ave., Vinita, 99000673

Lincoln County

National Guard Statistical Building, Park Rd., 1 blk W of 6th St., Chandler, 99000672

Oklahoma County

Smith and Kernke Funeral Directors, 1401 NW 23rd St., Oklahoma City, 99000671

PENNSYLVANIA

Delaware County

Pennsylvania Railroad Station at Wayne, Jct. of N. Wayne Ave. and Station Rd., Wayne, 99000674

RHODE ISLAND

Newport County

Horsehead—Marbella, 240 Highland Dr., Jamestown, 99000675

SOUTH DAKOTA

Custer County

Archeological site no. 39CU1619, Address Restricted, Custer vicinity, 99000679

Gregory County

Mitchell West Central Residential Historic District, Roughly bounded by First and Seventh Aves., Mitchell, 99000676
Tackett Underwood Building, Address Restricted, Gregory vicinity, 99000678

Jerauld County

Wessington Springs Carnegie Library (Historic Bridges in South Dakota MPS) 124 N. Main Ave., Wessington Springs, 99000677

Minnehaha County

Palisades Bridge (Historic Bridges in South Dakota MPS), 25495 485th Ave., Garretson, 99000687

Walworth County

Walworth County Courthouse (County Courthouses of South Dakota MPS), 4304 4th Ave., Selby, 99000680

VIRGINIA

Franklin County

Rocky Mount Historic District, Roughly bounded by Franklin, and Maynor Sts.; Floyd Ave.; E. Court St; and Maple Ave., Rocky Mount, 99000683

York County

Old Custom House, Jct. of Main and Read Sts., Yorktown, 99000682

WISCONSIN

Forest County

Otter Spring House, Approx. 80 meters S of Spring Pond Rd., Lincoln vicinity, 99000684

A Request for a Move has been made for the following resource:

WISCONSIN

Dane County

Crosse, Dr. Charles G., House 133 W. Main St., Sun Prairie, 93000029

A Request for a Removal has been made for the following resource:

INDIANA

Vermillion County

Brouilletts Creek Covered Bridge, Co. Rds 100 W and 1700S over Brouilletts Cr., Clinton 94000586

A Correction is hereby made for the following resouce:

For Technical reasons this nomination should not have been published and is no longer considered a pending National Register of Historic Places Nomination.

NORTH CAROLINA

Carteret County

Cape Lookout Village Historic District, Cape Lookout, from Lighthouse to Cape Point, Harkers Island, 99000599

[FR Doc. 99–12403 Filed 5–17–99; 8:45 am]

BILLING CODE 4310–70–U

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Intent to Solicit Comments on the Development of Surplus Criteria for Management of the Colorado River and to Initiate National Environmental Policy Act (NEPA) Process

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice to solicit comments and initiation of NEPA process.

SUMMARY: The Department of the Interior, Bureau of Reclamation (''Reclamation''), is considering development of specific criteria that will identify those circumstances under which the Secretary of the Interior (''Secretary'') may make Colorado River water available for delivery to the States of Arizona, California, and Nevada (Lower Division States or Lower Basin) in excess of the 7,500,000 acre-foot Lower Basin apportionment.

DATES: We must receive all comments at the address below on or before June 30, 1999. In addition to accepting written comments, we will hold public scoping meetings prior to the closing of the comment period. We will hold the public scoping meetings to allow the public to comment on the need for, and content of, specific surplus criteria as part of the National Environmental Policy Act (NEPA) process initiated by this notice. We will notify you of the dates, times, and places for these meetings through the **Federal Register**, media outlets, and to all respondents to this notice.

ADDRESSES: You may submit comments to the Regional Director, Lower Colorado Region, Attention: Jayne Harkins, Bureau of Reclamation, P.O. Box 61470, Boulder City, Nevada 89006–1470.

SUPPLEMENTARY INFORMATION: The Secretary, pursuant to the Boulder Canyon Project Act of December 28, 1928, and the Supreme Court opinion rendered June 3, 1963, and decree entered March 9, 1964 (Decree), in the case of *Arizona* v. *California*, *et al.*, is vested with the responsibility to manage the mainstream waters of the Colorado River in the Lower Basin. As the agency

that has been designated to act in the Secretary's behalf with respect to these matters, Reclamation intends to scope and, if appropriate, to develop and implement specific criteria under which ''surplus'' determinations will be made for the Lower Basin States.

Currently, each year, the Secretary establishes an Annual Operating Plan (AOP) for the Colorado River Reservoirs. The AOP describes how Reclamation will manage the reservoirs over a twelve month period, consistent with the ''Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968'' (Long-Range Operating Criteria) and the Decree. Reclamation consults annually with the Colorado River Basin States, Indian Tribes, and other interested parties in the development of the AOP. Further, as part of the AOP process, the Secretary makes annual determinations under the Long-Range Operating Criteria, regarding the availability of Colorado River water for deliveries to the Lower Division States. To meet the consultation requirements of federal law, Reclamation also consults with the Colorado River Basin States, Indian Tribes, and other interested parties during the five-year periodic reviews of the Long-Range Operating Criteria.

In recent years, demand for Colorado River water in Arizona, California, and Nevada has exceeded the Lower Basin's 7,500,000 acre-foot basic apportionment. As a result, criteria for determining the availability of surplus has become a matter of increased importance. Under these circumstances, the Secretary believes that it may be prudent to develop specific criteria that will guide the Secretary's annual decision regarding the quantity of Colorado River water available for delivery to the Lower Basin States. Such surplus criteria would provide more predictability to States and water users. Reclamation anticipates however, that surplus criteria will be subject to change based upon new circumstances, and that such criteria may be interim in nature.

Reclamation may implement the surplus criteria by revising the Long-Range Operating Criteria set forth in Article III(3) or by developing interim implementing criteria pursuant to Article III(3) of the Long-Range Operating Criteria. Proceeding under Article III(3) may be particularly appropriate because Section 602 of the Colorado River Basin Project Act, as amended, requires that any modification to the Long-Range Operating Criteria be made ''only after correspondence with the Governors of the seven Colorado River Basin States and appropriate consultation with such state representatives as each Governor may designate.'' This statutory reference to the special role of the Basin States in matters relating to the Long-Range Operating Criteria underscores the importance of working closely with the states in developing surplus criteria. Reclamation intends to appropriately coordinate the development of surplus criteria with the Basin States, in accordance with this mandate. In that regard, Reclamation recognizes that efforts are currently underway to reduce California's reliance on surplus deliveries.

Reclamation will take account of progress in that effort, or lack thereof, in the decision-making process regarding specific surplus criteria. Reclamation also intends to make full use of technical information and approaches that have been developed through on-going discussions with the Basin States. This information can be obtained through the Reclamation contact listed above.

As part of the process initiated by this notice, Reclamation will analyze the effects of specific surplus criteria on potential future shortage determinations on the Colorado River. The criteria would be consistent with relevant Federal law and would recognize relevant provisions of the Law of the River, which has evolved out of a combination of Federal and State statutes, interstate compacts, court decisions and decrees, an international treaty, contracts with the Secretary, operating criteria, regulations, and administrative decisions.

Reclamation will utilize a public process pursuant to NEPA during the development of the surplus criteria. By this notice, Reclamation invites all interested parties, including the Colorado River Basin States, Indian Tribes, water users, members of the general public, organizations, and agencies to present written comments concerning the format for the criteria, the scope of specific surplus criteria, and the issues and alternatives that they suggest should be analyzed. As noted above, Reclamation will integrate the consultation requirements of Section 602 of the Colorado River Basin Project Act, as amended, into the NEPA process initiated by this notice. As part of this review, Reclamation will consult with state representatives of each of the Governors of the seven Colorado River Basin States, Indian Tribes, members of the general public, representatives of academic and scientific communities, environmental organizations, the recreation industry and contractors for the purchase of Federal power produced at Glen Canyon Dam.

Dated: May 13, 1999.

David J. Hayes,

Acting Deputy Secretary.

[FR Doc. 99–12491 Filed 5–17–99; 8:45 am]

BILLING CODE 4310–94–P

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Overseas Private Investment Corporation

Submission for OMB Review; Comment Request

AGENCY: Overseas Private Investment Corporation, IDCA.

ACTION: Request for comments.

SUMMARY: Under the provisions of the Paperwork Reduction Act (44 U.S.C. Chapter 35), Agencies are required to publish a Notice in the **Federal Register** notifying the public that the Agency has prepared an information collection request for OMB review and approval and has requested public review and comment on the submission. OPIC published its first Federal Register Notice on this information collection request on March 5, 1999, in 64 FR #43, p. 10721, at which time a 60-calendar day comment period was announced. This comment period ended May 5, 1999. No comments were received in response to this Notice.

This information collection submission has now been submitted to OMB for review. Comments are again being solicited on the need for the information, its practical utility, the accuracy of the Agency's burden estimate, and on ways to minimize the reporting burden, including automated collection techniques and uses of other forms of technology. The proposed form under review is summarized below.

DATES: Comments must be received on or before June 17, 1999.

ADDRESSES: Copies of the subject form and the request for review submitted to OMB may be obtained from the Agency Submitting Officer. Comments on the form should be submitted to the OMB Reviewer.

FOR FURTHER INFORMATION CONTACT:

OPIC Agency Submitting Officer: Carol Brock, Records Manager, Overseas Private Investment Corporation, 1100 New York Avenue, N.W., Washington, D.C. 20527; 202 336–8563.

OMB Reviewer: Jeff Hill, Office of Information and Regulatory Affairs, Office of Management and Budget, New Executive Office Building, Docket

Minnesota professional staff in consultation with representatives of the Bois Forte Band of the Minnesota Indian Tribe.

In 1984, human remains representing one individual from a site located on private land within the exterior boundaries of the Bois Forte Reservation near Lake Vermillion by Bois Forte Tribal Police. These human remains were turned over to the Minnesota State Archeologist and the Minnesota Indian Affairs Council. No known individual was identified. The 16 associated funerary objects include three beaver mandibles, one lynx mandible, one elk naviculocuboid, one beaver innominate, one fragement of beaver incisor, six bone awls, one harpoon awl, one hide flesher (moose or elk metatarsal), and one iron tranche (ice chisel).

Based on the associated funerary objects, this individual has been determined to be Native American from the historic period. These human remains and funerary objects were recovered within the exterior boundaries of the Bois Forte Reservation.

Based on the above mentioned information, officials of the Minnesota Indian Affairs Council have determined that, pursuant to 43 CFR 10.2 (d)(1), the human remains listed above represent the physical remains of one individuals of Native American ancestry. Officials of the Minnesota Indian Affairs Council have also determined that, pursuant to 43 CFR 10.2 (d)(2), the 16 objects listed above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony. Lastly, officials of the Minnesota Indian Affairs Council have determined that, pursuant to 43 CFR 10.2 (e), there is a relationship of shared group identity which can be reasonably traced between these Native American human remains and associated funerary objects and the Bois Forte Band of the Minnesota Chippewa Tribe.

This notice has been sent to officials of the Bois Forte Band of the Minnesota Chippewa Tribe and the Minnesota Chippewa Tribe. Representatives of any other Indian tribe that believes itself to be culturally affiliated with these human remains and associated funerary objects should contact James L. (Jim) Jones, Cultural Resource Specialist, Minnesota Indian Affairs Council, 1819 Bemidji Ave. Bemidji, MN 56601; telephone: (218) 755-3825, before June 28, 1999. Repatriation of the human remains and associated funerary objects to the Bois Forte Band of the Minnesota Chippewa Tribe may begin after that date if no additional claimants come forward.

Dated: April 22, 1999.

Francis P. McManamon,

Departmental Consulting Archeologist, DeManager, Archeology and Ethnography Program.

[FR Doc. 99–13600 Filed 5–27–99; 8:45 am]

BILLING CODE 4310–70–F

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Public Meetings on the Development of Surplus Criteria for Management of the Colorado River and To Initiate National Environmental Policy Act (NEPA) Process

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of public meetings.

SUMMARY: The Department of the Interior, Bureau of Reclamation (''Reclamation''), is considering development of specific criteria that will identify those circumstances under which the Secretary of the Interior (''Secretary'') may make Colorado River water available for delivery to the States of Arizona, California, and Nevada (Lower Division States or Lower Basin) in excess of the 7,500,000 acre-foot Lower Basin apportionment.

Reclamation published a **Federal Register** notice on Tuesday, May 18, 1999, regarding a Notice of Intent to solicit comments on the development of surplus criteria.

Reclamation invites all interested parties to present oral or written comments concerning the following: (1) The need for the development of surplus criteria, (2) the format for the criteria (either by revising the Long-Range Operating Criteria set forth in Article III(3) or by developing interim criteria pursuant to Article III(3) of the Long-Range Operating Criteria), and (3) the specific issues and alternatives to be analyzed in the National Environment Policy Act (NEPA) process.

DATES AND LOCATIONS: Written comments are requested by June 30, 1999, and should be sent to Regional Director, Lower Colorado Region, Attention: Jayne Harkins, Bureau of Reclamation, P.O. Box 61470, Boulder City, Nevada 89006–1470. Oral and written comments will be accepted at the public meetings to be held at the following locations:

Tuesday, June 15, Meeting Room 1 on Level 3, Terminal 4, Phoenix Sky Harbor Airport, Phoenix, Arizona, 6:30 p.m.–9 p.m.

Wednesday, June 16, Keller Peak Room, Doubletree Hotel, 222 N. Vineyard Ave., Ontario, California, 6:30 p.m.–9 p.m.

Tuesday, June 22, Zeus C Room, Alexis Park Resort, 375 East Harmon, Las Vegas, Nevada, 6:30 p.m.–9 p.m.

Wednesday, June 23, Hawk's Nest Conference Room, Terminal 1, Salt Lake International Airport, Salt Lake City, Utah, 6:30 p.m.–9 p.m.

FOR FURTHER INFORMATION CONTACT: Jayne Harkins, telephone (702) 293–8190; faxogram (702) 293–8042; E-mail at: jharkins@lc.usbr.gov or Randall Peterson, telephone (801) 524–3758, faxogram (801) 524–3858; E-mail at: *rpeterson@uc.usbr.gov.*

Dated: May 25, 1999.

Eluid L. Martinez,

Commissioner.

[FR Doc. 99–13667 Filed 5–27–99; 8:45 am]

BILLING CODE 4310–94–U

DEPARTMENT OF JUSTICE

[AAG/A Order No. 167–99]

Privacy Act of 1974; Notice of the Removal of a System of Records

Pursuant to the provisions of the Privacy Act of 1974 (5 U.S.C. 552a), the Procurement Policy and Review Group, Management and Planning Staff, Justice Management Division (JMD) is removing a published Privacy Act system of records entitled ''Delegations of Procurement Authority (DPA), JUSTICE/JMD–018.'' JUSTICE/JMD–018 was last published in the **Federal Register** on October 10, 1995, (60 FR 52704).

The DPA is no longer being used or maintained. The system was originally used, as part of a pre-award review of contract actions above a certain threshold, to ensure contracting officers in the Department's bureaus were exercising their procurement authority in accordance with the terms of their delegations. The system was also used to track training and career progression of bureau contracting officers. On May 31, 1995, the Procurement Executive discontinued the practice of performing pre-award reviews of all contract actions, including checks of contracting officers' delegations. In addition, consistent with the Justice Acquisition Regulations (63 FR 16118–16136), which delegate the responsibility of developing and managing career development programs to the bureaus, the DPA is no longer used for career development purposes.

Adobe Road, Twentynine Palms, California 92277

Thursday, December 16, 1999 at 7 pm Needles City Hall, 1111 Bailey Avenue, Needles, California 92363

DATES: Comments must be received in writing to the Metropolitan Water District no later than February 22, 2000.

ADDRESSES: Written comments on the Draft EIR/EIS should be mailed to: Metropolitan Water District of Southern California, Post Office Box 54153, Los Angeles, California 90054–0153, Attention: Mr. Dirk Reed.

FOR FURTHER INFORMATION CONTACT: Further information regarding the project may be obtained from Mr. Reed at (213) 217–6163 or Mr. Jack Safely at (213) 217–6981.

Dated: December 1, 1999.

Douglas Romoli,

Acting District Manager.

[FR Doc. 99–31604 Filed 12–6–99; 8:45 am]

BILLING CODE 4310–40–P

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate a Cultural Item in the Possession of the Fort Concho National Historic Landmark, San Angelo, TX

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is hereby given under the Native American Graves Protection and Repatriation Act, 43 CFR 10.10 (a)(3), of the intent to repatriate a cultural item in the possession of the Fort Concho National Historic Landmark, San Angelo, TX which meets the definition of ''unassociated funerary object'' under Section 2 of the Act.

The cultural item is a large Jordano brown ceramic pot with a kill hole at the bottom.

In 1952, this item was donated to the Fort Concho National Historic Landmark by Hollen Mayes. Museum documentation indicates it was removed from a burial in the Diablo Mountains near Van Horn, Culberson County, TX. While the external finish and interior have been greatly altered due to conservation attempts, the form and style of this item is consistent with known Tigua ceramics. Oral history presented by representatives of the Ysleta del Sur Pueblo of Texas indicates this cultural item was originally in the possession of a Tigua (Ysleta del Sur Pueblo) tribal member who as killed near Van Horn, TX.

Officials of the Fort Concho National Historic Landmark have determined that, pursuant to 43 CFR 10.2 (d)(2)(ii), this cultural item is reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and is believed, by a preponderance of the evidence, to have been removed from a specific burial site of an Native American individual. Officials of the Fort Concho National Historic Landmark have also determined that, pursuant to 43 CFR 10.2 (e), there is a relationship of shared group identity which can be reasonably traced between this item and Ysleta del Sur Pueblo of Texas.

This notice has been sent to officials of Ysleta del Sur Pueblo of Texas. Representatives of any other Indian tribe that believes itself to be culturally affiliated with this object should contact Kathleen S. Roland, Curator of Collections, Fort Concho National Historic Landmark, 630 S. Oakes St., San Angelo, TX 76903; telephone: (915) 657-4440 before January 6, 2000. Repatriation of this object to Yselta del Sur Pueblo may begin after that date if no additional claimants come forward.

Dated: November 30, 1999.

Francis P. McManamon,

Departmental Consulting Archeologist, Manager, Archeology and Ethnography Program.

[FR Doc. 99–31568 Filed 12–6–99; 8:45 am]

BILLING CODE 4310–70–F

DEPARTMENT OF INTERIOR

Bureau of Reclamation

Colorado River Interim Surplus Criteria; Notice of Intent To Prepare an Environmental Impact Statement

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of intent to prepare an environmental impact statement.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality's regulations for implementing the procedural provisions of NEPA, the Department of the Interior, Bureau of Reclamation (''Reclamation''), proposes to prepare an Environmental Impact Statement (''EIS'') for development of interim implementing criteria pursuant to Article III (3) of the Long-Range Operating Criteria that will be used by the Secretary of the Interior (''Secretary'') to determine surplus conditions for management of the Colorado River.

Reclamation previously published **Federal Register** notices on Tuesday, May 18, 1999 (64 FR 27008) and Friday May 28, 1999 (64 FR 29068) announcing its intention to consider the development of specific criteria that will identify those circumstances under which the Secretary may make Colorado River water available for delivery to the States of Arizona, California, and Nevada (Lower Division States or Lower Basin) in excess of the 7,500,000 acre-foot Lower Basin apportionment. Those notices announced four public scoping meetings and requested oral and written comments on the need for such criteria, the format for the criteria, the scope of specific surplus criteria, and the issues and alternatives that should be analyzed.

The public comment period ran from May 18, 1999 until June 30, 1999. In addition to oral comments submitted at four public scoping meetings, we received 32 letters during the comment period. The respondents included one irrigation district, three water districts, two individuals, three environmental organizations, nine state agencies, two federal organizations, three tribes, two cities, three water users associations, one corporation, one water resource organization, one conservation district and one public utility.

Based on the public comments received, Reclamation has made the decision to prepare an EIS that evaluates the potential impacts of alternative implementing interim criteria that will be used by the Secretary to determine surplus conditions for management of the Colorado River.

Supplementary information is provided in the aforementioned May 18, 1999 **Federal Register** notice.

FOR FURTHER INFORMATION CONTACT: Jayne Harkins, telephone (702) 293–8190; faxogram (702) 293–8042; E-mail at: *jharkins@lc.usbr.gov* or Tom Ryan, telephone (801) 524–3732, faxogram (801) 524–3858; E-mail at: tryan@uc.usbr.gov.

Dated: December 1, 1999.

David J. Hayes,

Acting Deputy Secretary of the Interior.

[FR Doc. 99–31681 Filed 12–6–99; 8:45 am]

BILLING CODE 4310–94–P

INTERNATIONAL TRADE COMMISSION

Sunshine Act Meeting

AGENCY HOLDING THE MEETING: United States International Trade Commission.

TIME AND DATE: December 10, 1999 at 11:00 a.m.

DEPARTMENT OF THE INTERIOR

National Park Service

National Register of Historic Places; Notification of Pending Nominations

Nominations for the following properties being considered for listing in the National Register were received by the National Park Service before July 1, 2000. Pursuant to section 60.13 of 36 CFR part 60 written comments concerning the significance of these properties under the National Register criteria for evaluation may be forwarded to the National Register, National Park Service, 1849 C St. NW, NC400, Washington, DC 20240. Written comments should be submitted by July 24, 2000.

Beth M. Boland,

Acting Keeper of the National Register.

CONNECTICUT

Hartford County

Coult, Abraham, House, 1695 Hebron Ave., Glastonbury, 00000834
Hartford Electric Light Company Maple Avenue Sub-Station, 686 Maple Ave., Hartford, 00000833

New Haven County

West Haven Green Historic District, Roughly along Main St., Campbell St., Church St. and Savin St., West Haven, 00000832

NEBRASKA

Lancaster County

Herter Farmstead, 4949 S 148th, Walton, 00000835

NEW YORK

Rensselaer County

St. Mark's Episcopal Church, Main St., Hoosick Falls, 00000836

Sullivan County

Hankins Stone Arch Bridge, (Upper Delaware Valley, New York and Pennsylvania, MPS) Sullivan Cty. Rd. 94, E., Hankins, 00000838
Manny, Anthony, House, (Upper Delaware Valley, New York and Pennsylvania, MPS) 6 Hankins Rd., Hankins, 00000840
Tusten Stone Arch Bridge, (Upper Delaware Valley, New York and Pennsylvania, MPS) Tusten Rd. at Ten Mile River, Tusten, 00000839

Westchester County

Scarsdale Railroad Station, Popham Rd. at Bronx River Pkwy., Scarsdale, 00000837

NORTH CAROLINA

Chatham County

Siler City Commercial Historic District, Roughly bounded by Second Ave., Birch Ave., Third St. and Beaver St., Siler City, 00000841

Polk County

Railway Clerks' Mountain House, US 176, 0.6 mi. Se of jct. with Ozone Rd., Saluda, 00000842

PENNSYLVANIA

Berks County

Red Men Hall, 831–833 Walnut St., Reading, 00000843

Chester County

Zook House, (West Whiteland Township MRA) 100 Exton Sq., Exton, W. Whiteland, 00000844

Dauphin County

Star Barn Complex, Nissley Dr. at PA 283, Lower Swatara, 00000845

Lancaster County

New Holland Machine Company, 146 E. Franklin St., New Holland, 00000846

Philadelphia County

Bell Telephone Company Building, 1827–35 Arch St., Philadephia, 00000849

York County

Bixler, Michael and Magdealena Farmstead, 400 Mundis Race Rd., East Manchester, 00000850
Red Lion Borough Historic District, Roughly bounded by Edgewood Ave., Windsor Twp. line, MD&PA RR., Chestnut Rd., Country Club Rd., and York Twp. line., Red Lion, 00000847
Sinking Springs Farms, Roughly bounded by Church Rd., Sinking Springs Ln., N. George St., Locust Ln., Susquehanna Trail and PA 238, Manchester, 00000848

WISCONSIN

Ozaukee County

Bigelow School, 4228 W. Bonniwell Rd., Mequon, 00000851

WYOMING

Crook County

Entrance Road—Devils Tower National Monument, (Devils Tower National Monument MPS) Devils Tower National Monument, Devils Tower, 00000854
Entrance Station—Devils Tower National Monument, (Devils Tower National Monument MPS) Devils Tower National Monument, Devils Tower, 00000853
Old Headquarters Area Historic District, (Devils Tower National Monument MPS) Devils Tower National Monument, Devils Tower, 00000852
Tower Ladder—Devils Tower National Monument, (Devils Tower National Monument MPS) Devils Tower National Monument, Devils Tower, 00000855

[FR Doc. 00–17267 Filed 7–6–00; 8:45 am]

BILLING CODE 4310–70–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Colorado River Interim Surplus Criteria

AGENCY: Bureau of Reclamation, Department of the Interior.

ACTION: Notice of availability of a draft environmental impact statement and public hearings for the proposed adoption of Colorado River Interim Surplus Criteria: INT–DES 00–25.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA, the Bureau of Reclamation (Reclamation), has issued a Draft Environmental Impact Statement (DEIS) on the proposed adoption of specific criteria under which surplus water conditions may be determined in the Lower Colorado River Basin during the next 15 years. Cooperating agencies are the National Park Service and the International Boundary and Water Commission, United States Section. Information on public hearings may be found below in the **DATES** section.

ADDRESSES: Send comments on the DEIS to Ms. Jayne Harkins, Attention BCOO–4600, PO Box 61470, Boulder City, Nevada, 89006–1470, or fax comments to Ms. Harkins at (702) 293–8042. Comments must be received no later than September 8, 2000.

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

DATES: Comments on this DEIS must be received no later than September 8, 2000.

Public hearings will be held to receive written or verbal comments on the DEIS from interested organizations and individuals on the environmental impacts of the proposal. The hearings

will be held at the following times and locations:

- August 3, Meeting Room 1 on Level 3, Terminal 4, Phoenix Sky Harbor International Airport, Phoenix, Arizona, 7 p.m.
- August 8, Big Bear Room, Doubletree Hotel, 222 N. Vineyard Ave., Ontario, CA, 7 p.m.
- August 10, Jazz Room, Salt Lake City International Airport, 765 Terminal Drive, Salt Lake City, Utah, 7 p.m.
- August 15, Comfort Dental Conference Room, Las Vegas Chamber of Commerce, 3720 Howard Hughes Parkway, Las Vegas, NV, 7 p.m.

In addition to the public hearings, a separate hydrologic modeling meeting will be held on the same day as the public hearing in Las Vegas, NV. Reclamation will provide detailed assumptions and respond to questions regarding the model runs, use schedules, and post-processing analysis that was completed for this DEIS. The time and location for this technical meeting is as follows:

- August 15, Comfort Dental Conference Room, Las Vegas Chamber of Commerce, 3720 Howard Hughes Parkway, Las Vegas, NV, 9 a.m. to 5 p.m.

The hearings and the hydrologic modeling meeting will accommodate those with hearing impairments or other special requirements upon request by calling Janet Steele at (702) 293–8551 at least 48 hours prior to the hearing.

The DEIS is available for viewing on the Internet at *http://www.lc.usbr.gov* and *http://www.uc.usbr.gov.* Copies of the DEIS, in the form of a printed document or on compact disk, are available upon written request to the following address: Ms. Janet Steele, Attention BCOO–4601, PO Box 61470, Boulder City, Nevada 89006–1470, Telephone: (702) 293–8785, or by fax at (702) 293–8042.

See **SUPPLEMENTARY INFORMATION** section for a list of libraries where the DEIS is available for public inspection and review.

FOR FURTHER INFORMATION CONTACT: For additional information, contact Ms. Jayne Harkins at the above address or telephone Ms. Harkins at (702) 293–8785.

SUPPLEMENTARY INFORMATION: The Secretary of the Interior (Secretary) currently manages the lower Colorado River system in accordance with federal law (including the provisions of the 1964 U.S. Supreme Court decree, as supplemented, in *Arizona* v. *California* (the Decree)), the Colorado River Basin Project Act of 1968 (CRBPA) and Long Range Operating Criteria (LROC) pursuant to the CRBPA. Within this legal framework, the Secretary makes annual determinations regarding the availability of surplus water from Lake Mead by considering various factors, including the amount of water in storage and predictions for natural runoff. The Decree provides that if there exists sufficient water available in a single year for release from Lake Mead to satisfy annual consumptive use in the states of Arizona, California, and Nevada in excess of 7.5 million-acre feet, such water may be determined by the Secretary to be made available as surplus water.

The purpose of and need for establishing interim surplus criteria is to assist the Secretary in making annual determinations of surplus conditions, and will afford entities that have contracted for surplus water a greater degree of predictability with respect to the annual existence of surplus water available for diversion. This greater predictability would assist these entities in the management of their water resources.

The DEIS presents four possible alternatives for implementation, plus a ''No Action Alternative.'' The DEIS does not include a preferred alternative. The interim surplus criteria alternatives have been formulated to be consistent with applicable federal law and the LROC, described above.

The four potential action alternatives are: a ''Flood Control Alternative,'' which would provide surplus water only when flood control releases from Lake Mead are needed, based on the current criteria for making such releases; the ''Six States Alternative'' and ''California Alternative,'' both of which specify various Lake Mead water surface elevations to be used as ''triggers'' to indicate when surplus conditions exist; and the ''Shortage Protection Alternative,'' which would permit surplus conditions to be determined above a specific elevation positioned to ensure enough water remains in Lake Mead to provide a one-year water supply to Arizona, California, Nevada, and Mexico, and to protect against dropping the lake's water level below a specified elevation.

Libraries Where the Draft EIS is Available for Public Inspection and Review:

- Department of the Interior, Natural Resources Library, 1849 C Street, NW, Washington, DC 20240.
- Lower Colorado Regional Office, PO Box 61470, Boulder City, Nevada 89006–1470.
- Phoenix Area Office, Concorde Commerce Center, 2222 West Dunlap Ave., Suite 100, Phoenix, Arizona 85069–1169.
- Yuma Area Office, 7301 Calle Aqua Salada, Yuma, Arizona, 85366–7504.
- Upper Colorado Regional Office, 125 South State St., Room 6107, Salt Lake City, Utah 84138–1102.
- Boulder City Library, 813 Arizona, Boulder City, NV 89005. Henderson District Public Library, 280 South Water St., Henderson, NV 89015.
- Los Angeles Central Library, 630 W 5th St. Los Angeles, CA 90071.
- San Diego Central Library, 820 E St., San Diego, CA 92101.
- Salt Lake City Public Library, 209 E 500 S., Salt Lake City, UT 84111.
- Albuquerque Public Library, 501 Copper Ave. NW, Albuquerque, NM 87102.
- Denver Public Library, 10 W 14th Ave. Pkwy, Denver, CO 80204.
- Laramie County Library, 2800 Central Ave., Cheyenne, WY 82001.
- Phoenix Public Library (Burton Barr Central), 1221 N. Central Ave., AZ 85004.
- Government Reference Library, City Hall, 9th Floor, Tucson, AZ 85701.
- Mohave County Library, 1170 Hancock Rd., Bullhead City, AZ 86442.
- San Bernardino County Library, 1111 Bailey Ave., Needles, CA 92363.
- Lake Havasu City Library, 1787 McCulloch Blvd. North, Lake Havasu City, AZ, 86403.
- Parker Public Library, 1001 South Navajo Ave., Parker, AZ 85344.
- Palo Verde Valley Library, 125 W. Chanslor Way, Blythe, CA 92225.
- Yuma County Library, 350 S. 3rd Ave., Yuma, AZ 85364.

Dated: June 30, 2000.

Willie R. Taylor,

Director, Office of Environmental Policy and Compliance, Department of the Interior.

[FR Doc. 00–17194 Filed 7–6–00; 8:45 am]

BILLING CODE 4310–MN–P

INTERNATIONAL TRADE COMMISSION

[Investigations Nos. 731–TA–872–883 (Preliminary)]

Certain Steel Concrete Reinforcing Bars From Austria, Belarus, China, Indonesia, Japan, Korea, Latvia, Moldova, Poland, Russia, Ukraine, and Venezuela

AGENCY: United States International Trade Commission.

ACTION: Institution of antidumping investigations and scheduling of preliminary phase investigations.

of the Gettysburg National Military Park located at 97 Taneytown Road, Gettysburg, Pennsylvania 17325.

Dated: July 20, 2000.

John A. Latschar,

Superintendent, Gettysburg NMP/Eisenhower NHS.

[FR Doc. 00–19473 Filed 8–1–00; 8:45 am]

BILLING CODE 4310–70–M

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Availability of the Draft Revision of the Vacation Cabin Site Policy at Lake Mead National Recreation Area

AGENCY: National Park Service, Interior.

ACTION: Notice of availability.

SUMMARY: The National Park Service announces the availability for public review of the draft revision of the Vacation Cabin Site policy at Lake Mead National Recreation Area.

COMMENTS: Written comments must be postmarked or transmitted by September 1, 2000.

If individuals submitting comments request that their name and/or address be withheld from public disclosure, it will be honored to the extent allowable by law. Such requests must be stated prominently in the beginning of the comments. There also may be circumstances wherein the NPS will withhold a respondent's identity as allowable by law. As always: NPS will make available to public inspection all submissions from organizations or businesses and from persons identifying themselves as representatives or officials of organizations and businesses; and, anonymous comments may not be considered.

ADDRESSES: The draft revision of the Vacation Cabin Site policy is available on the Internet at *http://www.nps.gov/lame/concessions/vcs.html.* Requests for copies and written comments should be sent to Superintendent, Lake Mead National Recreation Area, 601 Nevada Highway, Boulder City, Nevada 89005

FOR FURTHER INFORMATION CONTACT: Concessions Program Management at 702/293–8923.

SUPPLEMENTARY INFORMATION: The last revision of the Lake Mead National Recreation Area Vacation Cabin Site policy occurred in 1992. Cabin site lease extensions expired in 1999 and 2000 and are being reauthorized for a one-year extension upon expiration. When the revised cabin site policy is finalized new permits will be issued for a five year period, the maximum length of time allowed by law. The finalized policy will become part of the permit.

There are three vacation cabin site areas within Lake Mead National Recreation Area. Stewart's Point (54 sites), located along Lake Mead in Nevada, approximately two miles northeast of Rogers Spring. Temple Bar (32 sites), located along Lake Mead in Arizona, approximately one mile southeast of Temple Bar Resort. Katherine (35 sites), located along Lake Mohave in Arizona, approximately two miles north of Katherine Landing.

Dated: July 14, 2000.

Alan O'Neill,

Superintendent, Lake Mead National Recreation Area.

[FR Doc. 00–19474 Filed 8–1–00; 8:45 am]

BILLING CODE 4310–70–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Colorado River Interim Surplus Criteria

AGENCY: Bureau of Reclamation, Department of the Interior.

ACTION: Notice of revised dates for public hearings on the proposed adoption of Colorado River Interim Surplus Criteria: INT–DES 00–25.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA, the Bureau of Reclamation (Reclamation), has issued a Draft Environmental Impact Statement (DEIS) on the proposed adoption of specific criteria under which surplus water conditions may be determined in the Lower Colorado River Basin during the next 15 years.

This notice updates the **Federal Register** notice published on July 7, 2000 (65 FR 42028) and provides notice of revised dates for public hearings on the proposed adoption of Colorado River Interim Surplus Criteria. Information on revised dates and locations for public hearings may be found below in the **DATES** section.

ADDRESSES: The comment period on the DEIS remains unchanged. Send comments on the DEIS to Ms. Jayne Harkins, Attention BCOO–4600, PO Box 61470, Boulder City, Nevada, 89006–1470, or fax comments to Ms. Harkins at (702) 293–8042. As provided in the **Federal Register** notice published on July 7, 2000 (65 FR 42028), comments on the DEIS must be received no later than September 8, 2000.

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

DATES: The public comment period on the DEIS remains unchanged and comments on this DEIS must be received no later than September 8, 2000.

Public hearings will be held to receive written or verbal comments on the DEIS from interested organizations and individuals on the environmental impacts of the proposal. The public hearings identified in the **Federal Register** notice published on July 7, 2000 (65 FR 42028) will not be held. Instead, a revised schedule for the hearings follows. The hearings will be held at the following times and locations:

- August 21, Big Bear Room, Doubletree Hotel, 222 N. Vineyard Ave., Ontario, CA, 7 p.m.
- August 22, Comfort Dental Conference Room, Las Vegas Chamber of Commerce, 3720 Howard Hughes Parkway, Las Vegas, NV, 7 p.m.
- August 23, Jazz Room, Salt Lake City International Airport, 765 Terminal Drive, Salt Lake City, Utah, 7 p.m.
- August 24, Meeting Room 1 on Level 3, Terminal 4, Phoenix Sky Harbor Airport, Phoenix, Arizona, 7 p.m.

In addition to the public hearings, a separate hydrologic modeling meeting will be held in Las Vegas, NV. Reclamation will provide detailed assumptions and respond to questions regarding the model runs, use schedules, and post-processing analysis that was completed for this DEIS. The time and location for the hydrologic modeling meeting has not changed from the information provided in the **Federal Register** notice published on July 7, 2000 (65 FR 42028). The time and location for this technical meeting is as follows:

- August 15, Comfort Dental Conference Room, Las Vegas Chamber

of Commerce, 3720 Howard Hughes Parkway, Las Vegas, NV, 9 a.m. to 5 p.m.

The hearings and the hydrologic modeling meeting will accommodate those with hearing impairments or other special requirements upon request by calling Janet Steele at (702) 293–8551 at least 48 hours prior to the hearing.

The DEIS remains available for viewing on the Internet at *http://www.lc.usbr.gov* and *http://www.uc.usbr.gov.* Copies of the DEIS, in the form of a printed document or on compact disk, remain available upon written request to the following address: Ms. Janet Steele, Attention BCOO–4601, PO Box 61470, Boulder City, Nevada 89006–1470, Telephone: (702) 293–8785, or by fax at (702) 293–8042.

FOR FURTHER INFORMATION CONTACT: For additional information, contact Ms. Jayne Harkins at the above address or telephone Ms. Harkins at (702) 293–8785.

Dated: July 28, 2000.

Erica Petacchi,

Federal Register Liaison.

[FR Doc. 00–19580 Filed 8–1–00; 8:45 am]

BILLING CODE 4310–MN–P

INTERNATIONAL TRADE COMMISSION

[Investigation No. 731–TA–527 (Review)]

Extruded Rubber Thread From Malaysia

Determination

On the basis of the record [1] developed in the subject five-year review, the United States International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. 1675(c)) (the Act), that revocation of the antidumping duty order on extruded rubber thread from Malaysia would likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

Background

The Commission instituted this review on August 2, 1999 (64 FR 41954) and determined on November 4, 1999 that it would conduct a full review (64 FR 62689, November 17, 1999). Notice of the scheduling of the Commission's review and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the **Federal Register** on January 20, 2000 (65 F.R. 3246). The hearing was held in Washington, DC, on June 1, 2000, and all persons who requested the opportunity were permitted to appear in person or by counsel.

The Commission transmitted its determinations in this investigation to the Secretary of Commerce on July 27, 2000. The views of the Commission are contained in USITC Publication 3327 (July 2000), entitled *Extruded Rubber Thread from Malaysia (Inv. No. 731–TA–527 (Review)).*

Issued: July 27, 2000.

By order of the Commission.

Donna R. Koehnke,

Secretary.

[FR Doc. 00–19570 Filed 8–1–00; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigations Nos. 731–TA–639 and 640 (Review)]

Forged Stainless Steel Flanges From India and Taiwan

Determination

On the basis of the record [1] developed in the subject five-year reviews, the United States International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. 1675(c)), that revocation of the antidumping duty orders on forged stainless steel flanges from India and Taiwan would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

Background

The Commission instituted these reviews on December 1, 1999 (64 FR 67313, December 1, 1999) and determined on March 3, 2000 that it would conduct expedited reviews (65 FR 15009, March 20, 2000). The Commission transmitted its determinations in these reviews to the Secretary of Commerce on July 26, 2000. The views of the Commission are contained in USITC Publication 3329 (July 2000), entitled *Forged Stainless Steel Flanges from India and Taiwan: Investigations Nos. 731–TA-639 and 640 (Review).*

Issued: July 27, 2000.

By order of the Commission.

Donna R. Koehnke,

Secretary.

[FR Doc. 00–19568 Filed 8–1–00; 8:45 am]

BILLING CODE 7020–02–P

INTERNATIONAL TRADE COMMISSION

[Investigations Nos. 701–TA–309–A–B and 731–TA–528 (Review)]

Magnesium From Canada

Determinations

On the basis of the record [1] developed in the subject five-year reviews, the United States International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. § 1675(c)) (the Act), that revocation of the countervailing duty orders [2] and the antidumping duty order on magnesium from Canada would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

Background

The Commission instituted these reviews on August 2, 1999, (64 FR 41961) and determined on November 4, 1999, that it would conduct full reviews (64 FR 62690, November 17, 1999). Notice of the scheduling of the Commission's reviews and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the **Federal Register** on February 10, 2000 (65 FR 6628). The hearing was held in Washington, DC, on May 31, 2000, and all persons who requested the opportunity were permitted to appear in person or by counsel.

The Commission transmitted its determinations in these investigations to the Secretary of Commerce on July 25, 2000. The views of the Commission are contained in USITC Publication 3324 (July 2000), entitled *Magnesium from Canada: Investigations Nos. 701–TA–309–A–B and 731–TA–528 (Review).*

Issued: July 26, 2000.

[1] The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 CFR § 207.2(f)).

[1] The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 C.F.R. § 207.2(f)).

[1] The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 CFR § 207.2(f)).

[2] Commissioner Thelma J. Askey dissenting.

Street, NW., Room 7418, Washington, D.C. 20240.

FOR FURTHER INFORMATION CONTACT: Dr. Wes Henry at 202/208–5211 or Dr. William Schmidt at 202/501–9269.

Maureen Finnerty,

Associate Director, Park Operations and Education.

[FR Doc. 00–19955 Filed 8–7–00; 8:45 am]

BILLING CODE 4310–70–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Colorado River Interim Surplus Criteria

AGENCY: Bureau of Reclamation, Department of the Interior.

ACTION: Notice of public availability of information submitted on a draft environmental impact statement for the proposed adoption of Colorado River Interim Surplus Criteria: INT–DES 00–25.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA, the Bureau of Reclamation (Reclamation) has issued a Draft Environmental Impact Statement (DEIS) on the proposed adoption of specific criteria under which surplus water conditions may be determined in the Lower Colorado River Basin during the next 15 years. A notice of availability and public comment period was provided in a **Federal Register** notice published on July 7, 2000 (65 FR 42028).

As noted in the **Federal Register** notice published on May 18, 1999 (64 FR 27008), during this NEPA process Reclamation is consulting with state representatives of each of the Governors of the seven Colorado River Basin States, Indian Tribes, members of the general public, representatives of academic and scientific communities, environmental organizations, the recreation industry and contractors for the purchase of Federal power produced at Glen Canyon Dam. Reclamation has received information from the Colorado River Basin States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming during the public comment period on the proposed adoption of Colorado River Interim Surplus Criteria. The information provided to Reclamation is the product of significant effort on the part of the representatives of the Governors of the Colorado River Basin States. As noted in the **Federal Register** notice published on May 18, 1999 (64 FR 27008), the statutory framework for operation of Colorado River Reservoirs underscores the importance of working with the Colorado River Basin States in developing interim surplus criteria. Reclamation has made a preliminary review of the specific surplus criteria in the information presented by the Basin States and has made a preliminary determination that such criteria are within the range of alternatives and impacts analyzed in the DEIS. The information provided by the States does contain details regarding proposed surplus criteria that may be helpful to others preparing comments in response to the **Federal Register** notice published on July 7, 2000 (65 FR 42028). Accordingly, Reclamation is providing this information for public consideration during the public comment period on this action. That period will not be extended. Reclamation will be analyzing the issues and information presented in this submission, along with all other public comments on the Draft Environmental Impact Statement (DEIS) on the proposed adoption of Colorado River Interim Surplus Criteria. Reclamation, along with the Department of the Interior, will utilize this information, along with all other public comments, as appropriate, during its preparation of a Final Environmental Impact Statement and accompanying Record of Decision. The information provided by the representatives of the Colorado River Basin States may be found below in the **SUPPLEMENTARY INFORMATION** section.

The DEIS, and the information provided in the **SUPPLEMENTARY INFORMATION** section below are available for viewing on the Internet at http://www.lc.usbr.gov and http://www.uc.usbr.gov.

ADDRESSES: The comment period on the DEIS remains unchanged. Send comments on the DEIS to Ms. Jayne Harkins, Attention BCOO–4600, PO Box 61470, Boulder City, Nevada, 89006–1470, or fax comments to Ms. Harkins at (702) 293–8042. As provided in the **Federal Register** notice published on July 7, 2000 (65 FR 42028), comments on the DEIS must be received no later than September 8, 2000.

Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

Copies of the DEIS, in the form of a printed document or on compact disk, remain available upon written request to the following address: Ms. Janet Steele, Attention BCOO–4601, PO Box 61470, Boulder City, Nevada 89006–1470, Telephone: (702) 293-8785, or by fax at (702) 293–8042.

DATES: The public comment period on the DEIS remains unchanged and comments on this DEIS must be received no later than September 8, 2000.

FOR FURTHER INFORMATION CONTACT: For additional information, contact Ms. Jayne Harkins at the above address or telephone Ms. Harkins at (702) 293–8785.

SUPPLEMENTARY INFORMATION: The following information was received from the Colorado River Basin States:

Interim Surplus Guidelines—Working Draft

I. Background

A. The Boulder Canyon Project Act of 1928 (28 Stat. 1057) (the ''BCPA''), authorized the Secretary of the Interior (the ''Secretary'') to construct Hoover Dam and the All-American Canal, and to contract for the delivery and use of water from such facilities for irrigation and domestic uses. The effectiveness of the BCPA was contingent upon ratification of the Colorado River Compact of 1922 (the ''Compact'') by the Colorado River Basin States, or, in the alternative, upon ratification by six of said states, including California. The effectiveness of the BCPA was further contingent upon agreement by the state of California, by act of its legislature, irrevocably and unconditionally with the United States and for the benefit of the other Colorado River Basin States, as an express covenant and in consideration of the passage of the BCPA, to limit the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado River for use in California, to no more than 4.4 million acre-feet (''maf'') per year of the waters apportioned to the Lower Basin States by Article III(a) of the Compact, plus not more than one-half of any excess or surplus waters unapportioned by the

Compact, such use to be always subject to the terms of the Compact.

Six states, including California, ratified the Compact by 1929. The California Legislature also passed the California Limitation Act (Act of March 4, 1929; Ch. 16, 48th Sess.). Thus, the conditions of the BCPA were satisfied, the President proclaimed the BCPA effective on June 25, 1929 and the Secretary thereafter constructed Hoover Dam and the All-American Canal and executed contracts for the delivery and use of water from such facilities. Arizona ratified the Compact in 1944.

Before the Secretary entered into water delivery contracts with California agencies, he requested such agencies to agree to relative priorities of rights among them. This was accomplished by the California Seven-Party Agreement of August 18, 1931, incorporated into the water delivery contracts (the ''California Seven Party Agreement''), which established the following priorities within California:

CALIFORNIA SEVEN-PARTY AGREEMENT

Priority	Description	Acre-feet annually
1	Palo Verde Irrigation District—gross area of 104,500 acres	
2	Yuma Project (Reservation Division)—not exceeding a gross area of 25,000 acres	
3(a)	Imperial Irrigation District and lands in Imperial and Coachella Valleys to be served by the All-American Canal.	3,850,000
3(b)	Palo Verde Irrigation District—16,000 acres of mesa lands	
4	Metropolitan Water District and/or City of Los Angeles and/or others on coastal plain.	550,000
5(a)	Metropolitan Water District and/or City of Los Angeles and/or others on coastal plain.	550,000
5(b)	City and/or County of San Diego [1]	112,000
6(a)	Imperial Irrigation District and lands in Imperial and Coachella Valley	
6(b)	Palo Verde Irrigation District—16,000 acres of mesa lands	300,000
7	Agricultural Use in the Colorado River Basin in California	
Total		5,362,000

[1] In 1946, the City of San Diego, San Diego County Water Authority, Metropolitan Water District and the Secretary entered into a contract in which the right to storage and delivery of Colorado River water vested in the City of San Diego was merged with and added to the rights of the Metropolitan Water District under conditions since satisfied.

The California Seven-Party Agreement thus allocated water both within California's limitation of 4.4 maf per year, as well as surplus water above that amount. Only about one-half of the water under Priorities 4, 5(a) and 5(b) diverted by the Metropolitan Water District of Southern California (the ''MWD'') through its Colorado River Aqueduct is within the 4.4 maf limitation. Diversions under Priorities 5(a) and (b) are dependent upon surplus water being made available. The amounts of water allocated to Priorities 1, 2, 3(a) and 3(b) were not quantified by priority, but were aggregated to not exceed 3.85 maf.

In 1964, the U.S. Supreme Court entered its Decree in *Arizona* v. *California,* 376 U.S. 340 (1964) (the ''Decree''), pursuant to its Opinion in the same case, 373 U.S. 546 (1963). The Decree and the Court's Opinion confirmed and ordered the apportionment by the BCPA of water available for release from water controlled by the United States in the mainstream of the Colorado River downstream from Lee Ferry and within the United States to the states of Arizona (2.8 maf per year); California (4.4 maf per year); and Nevada (0.3 maf per year). The Decree also established certain federal reserved rights, and provided for the quantification of present perfected rights, all to be supplied from the apportionments decreed to each of the respective states. The Decree enjoins the Secretary from releasing mainstream water controlled by the United States for irrigation and domestic use in the Lower Division States (Arizona, California and Nevada) except in the following circumstances:

1. If sufficient mainstream water is available for release to satisfy 7.5 maf of annual consumptive use in the three Lower Division States, such water shall be made available in accordance with the basic apportionments set forth above. This is referred to as a ''Normal Year.'' (Article II(B)(1)).

2. If sufficient mainstream water is available for release to satisfy in excess of 7.5 maf of annual consumptive use in the three Lower Division States, water in excess of 7.5 maf shall be apportioned 50% for use in Arizona and 50% for use in California; provided, however, that in the event the United States so contracts with Nevada (which it has) then 46% of such surplus is apportioned for use in Arizona and 4% of such surplus is apportioned for use in Nevada. This is referred to as a ''Surplus Year.'' (Article II(B)(2)).

3. If insufficient mainstream water is available for release to satisfy 7.5 maf of annual consumptive use in the three Lower Division States, then after satisfying present perfected rights in order of priority, such water shall be apportioned consistent with the BCPA and the opinion of the Court, but in no event shall more that 4.4 maf be apportioned for use in California including all present perfected rights. Under § 301(b) of the Colorado River Basin Project Act of 1968, 82 Stat. 885, diversions from the Colorado River for the Central Arizona Project (the ''CAP'') shall be so limited as to assure the availability of water in quantities sufficient to provide for the aggregate annual consumptive use by holders of present perfected rights, by other users in the State of California served under existing contracts with the United States by diversion works theretofore constructed, and by other existing Federal reservations in that State, of 4.4 maf, and by users of the same character in Arizona and Nevada. This is referred to as a ''Shortage Year.'' (Article II(B)(3)).

4. If, in any one year, water apportioned for consumptive use in a State will not be consumed in that State, the Secretary may make available such apportioned but unused water during such year for consumptive use in another Lower Division State. No rights to the recurrent use of such water shall accrue by reason of the use thereof. (Article II(B)(6))

In the *Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado*

River Basin Project Act of September 30, 1968 (P.L. 90–537) (the ''Criteria''), the Secretary adopted Criteria implementing his authorities under the BCPA, as enjoined by the Decree. Article III of the Criteria provides for the determination of Normal, Surplus and Shortage conditions for the release from Lake Mead of mainstream water downstream from Lee Ferry for use in the Lower Division States.

B. California's basic annual mainstream apportionment of Colorado River water is 4.4 maf, whereas its use of Colorado River water has ranged from 4.2 to 5.2 maf since 1975. In the past, California was able to consumptively use water above its basic annual apportionment because the water use by both Arizona and Nevada was below their basic annual apportionments.

In 1991 and 1992, as California faced its fifth and sixth consecutive years of severe drought, entities in California were able to divert all of the water that they requested or could transport from the Colorado River within the Lower Basin's apportionment. However, Nevada's Colorado River water use was forecasted to exceed its basic apportionment of 300,000 acre-feet (''af'') in the first decade of the 21st century, and Arizona's water use was projected to reach its basic annual apportionment of 2.8 maf. This meant that, in the future, without the Secretary declaring a Surplus condition, California's use of Colorado River water would be limited to its 4.4 maf basic apportionment, some 750,000 af less than its forecasted use of Colorado River water. The bulk of any mandated reduction in California's water use would occur within the priorities held by MWD, which serves the coastal plain of southern California through its Colorado River Aqueduct.

Since 1964, California has made significant investments to offset the eventual reduction in available Colorado River water. These investments have included: developing additional sources of imported water, conservation (demand reduction and use efficiency improvements), surface and groundwater storage, local supplies, conjunctive use programs, reclaimed water projects, and recovery and treatment of contaminated groundwater. While these investments have significantly increased supplies and reduced demand for imported water, they have not been adequate to offset the reduction of Colorado River water to 4.4 maf per year, when considered in conjunction with population increases and the reduction in dependable State Water Project (the ''SWP'') and Los Angeles Aqueduct supplies. This reality has fueled further efforts to maximize the beneficial use of Colorado River water in California through cooperative conservation programs and transfers of conserved water.

C. Nevada is quickly approaching full use of its 0.3 maf basic apportionment. Nevada's basic apportionment is projected to meet its domestic needs (excluding groundwater recharge) until approximately 2007. Also, Nevada has a need for additional water above its basic apportionment before 2007 for groundwater recharge in local groundwater basins.

Nevada's long-term options for additional water supply include surplus Colorado River water, participation in the Arizona groundwater bank, a number of in-state options such as the Muddy and Virgin Rivers, recovery and treatment of poor quality shallow groundwater, import of groundwater from basins within Nevada, and recovery of water from local groundwater banks. Nevada projects that even with an aggressive water conservation program it will need additional water for domestic needs in about 2007 and the need will steadily increase to almost 40,000 af in 2016. Nevada also projects it could use an additional 30,000 to 50,000 af per year for local groundwater recharge when surplus supplies are available.

D. Arizona's Lower Basin apportionment is divided among a number of major agricultural, Indian, and municipal contractors. Geographically, there are numerous diversions by contractors located along the River corridor and there is the singular diversion by the CAP which delivers water through a series of aqueducts to the interior portion of the State.

Arizona's uses of Colorado River water are increasing rapidly, but primarily because the CAP, which was declared substantially complete in the early 1990's, is becoming more fully utilized. In contrast, uses by contractors located along the Colorado River in the Yuma and Parker areas have been developed for many years and their consumption has been stable. Increased municipal growth in the Yuma and Mohave County areas will gradually increase water demands over a period of many years, but some of the growth will result in a corresponding decrease in agricultural demand as farm lands are subdivided and urbanized. On-reservation uses by Indian Tribes located in proximity to the River are also well established, although the potential for increased consumptive use exists, especially on the Colorado River Indian Tribes (the ''CRIT'') Reservation.

CAP water uses will increase over time as municipal and Indian contractors complete necessary water treatment and delivery infrastructure. In the meantime, the CAP will deliver significant quantities of water to irrigation districts who will use the water to displace groundwater supplies. Arizona has also developed a major capability to use CAP water that would otherwise be unordered, for groundwater recharge activities. The largest purchaser of water for recharge purposes is the Arizona Water Banking Authority (the ''AWBA''), whose primary purpose is to firm municipal CAP water deliveries.

E. In January 1986, the Bureau of Reclamation (Reclamation) issued a special report titled *Colorado River—Alternative Operating Strategies for Distributing Surplus Water and Avoiding Spills.* This report suggested operating strategies for avoiding Lake Mead spills that went beyond the *Field Working Agreement between the Bureau of Reclamation and the Army Corps of Engineers for Flood Control Operation of Hoover Dam and Lake Mead,* but were, in essence, based on similar principles. Under one of these strategies, limited surpluses would be determined based on the need to provide adequate storage capacity for an assumed runoff rather than the actual yearly forecast in order to reduce the probability of reservoir spills.

One of the alternatives considered assumed that runoff to be the value of the 70th percentile of exceedance based on the historic record, which is equivalent to about 17.331 maf runoff above Lake Powell. This strategy was named OS 0.70 (''70R'') or ''space building to avoid reservoir spills'' in the 1986 report. This and other strategies have been utilized for long-range operation projections since 1986.

F. On October 18, 1999, the respective boards of Coachella Valley Water District (''CVWD''), Imperial Irrigation District (''IID''), MWD and the State of California released the Key Terms for Quantification Settlement (the ''Key Terms'') as the basis for obtaining public input and completing a Quantification Settlement Agreement (''Settlement Agreement'') among the districts. The Settlement Agreement provides the basis for California to reduce its reliance on Colorado River water above its basic apportionment. The agreement further will quantify the rights and uses of Colorado River water by designating water budgets for CVWD, IID, and MWD. The quantification of the rights and uses of water with respect to priorities 3 and 6 of the 1931 California Seven Party Agreement is designed to

help facilitate implementation of cooperative water supply programs, and provide a quantified baseline from which conservation and transfer programs can be measured. The Settlement Agreement is expected to be fully executed in January 2001, after the conditions precedent contained in the Key Terms have been satisfied.

California's Colorado River Water Use Plan (the ''Plan''), is a framework by which programs, projects, actions, policies and other activities would be coordinated and cooperatively implemented allowing California to meet its Colorado River water needs within its basic apportionment in Normal years.

The Plan describes resource and financial investments and provides overall coordination on important initiatives undertaken by the Colorado River Board of California member agencies and others. The diverse components of the Plan are designed to help protect and optimize California's Colorado River resources. Some of these are associated components, meaning that they don't directly involve Colorado River water but are needed by implementing entities to meet their water needs within California's Colorado River water apportionment. The components of the Plan are broad in scope addressing both quantity and quality of California's share of Colorado River water.

The California agencies with Colorado River rights and contractual interests are the principal implementing entities for the programs and projects described in the Plan, and for obtaining the necessary program and project approvals, conducting appropriate environmental reviews, and ensuring compliance with endangered species acts (federal and state).

The Plan is intended to be dynamic and flexible enough to allow for modifications in, and periodic updates to, the framework when and where appropriate, and to allow for the substitution of programs and projects within the Plan's components when they have been found to be more cost effective and/or appropriate. Programs undertaken by the California agencies to transition California's use of Colorado River water to its basic apportionment without potential major water supply and economic disruptions include:

- Further quantification of rights and use of Colorado River water in California where helpful to facilitate the optimum use of California's Colorado River resources;
- Cooperative core water supply programs and voluntary transfers;
- Increased efficiencies in water conveyance and use;
- Water storage and conjunctive use programs to increase normal and dry year water supplies;
- Voluntary water exchanges;
- Administrative actions necessary for effective use and management of water supplies;
- Improved reservoir management and operations;
- Drought and surplus water management plans;
- Coordinated project operations for increased water supply yield; and
- Groundwater management.

The State of California has supported Plan implementation from the General Fund. Most notably, $235 million was appropriated in 1998 for lining portions of the All American and Coachella Canals ($200 million) and for groundwater storage and conjunctive use programs ($35 million) identified in the Plan. Also, between 1996 and 2000, California voters approved historic levels of general obligation bond financing for improving California water supply reliability, water quality and for restoring watershed ecosystems. The funding support provided by the $995 million Safe, Clean, Reliable Water Supply Act in 1996; the $2.1 billion Safe Neighborhood Parks, Clean Water, Clean Air, and Coastal Protection Act in 2000; and the $1.97 billion Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act in 2000 extend to the implementation of the Plan.

The proposed Settlement Agreement, other proposed interagency agreements and associated implementation agreement(s) with the Secretary, together with the Secretary's administration of water rights and use below Glen Canyon Dam, constitute the principal binding and enforceable provisions of the Plan. Provisions regarding third and sixth priority use provide the mechanisms needed to help facilitate the voluntary shift of approximately 380,000 af per year from agricultural use to urban use on the coastal plain of Southern California and the needed quantified baseline by which such programs can be measured.

The Settlement Agreement, when fully executed, provides the basis for California to meet its Colorado River water supply needs from within its annual apportionment of Colorado River water. Specific terms of the settlement include:

- A shift of 380,000 acre-feet per year from agriculture to urban use, through water acquisitions from IID and CVWD to MWD and SDCWA and forbearance of the use of 38,000 acre-feet per year of 6th priority water by IID and CVWD for MWD's use;
- Caps on use of water by IID and CVWD under the third priority at 3.1 maf and 0.33 maf, respectively;
- The exclusive right for MWD to utilize all water below 420,000 acre-feet per year unused by the Palo Verde Irrigation District and the Yuma Project-Reservation Division collectively;
- A permanent water supply of 16,000 acre-feet per year for the San Luis Rey (the ''SLR'') Indian Water Rights Settlement, from the All American and Coachella Canal Lining Projects;
- Deductions from IID, CVWD, and MWD's supplies to permit the Secretary to satisfy use of miscellaneous and Indian present perfected rights by holders of those rights as they were not addressed in the 1931 Seven-Party Agreement, the majority of the rights having been quantified in 1979; and
- A net yield of up to 90,000 acre-feet per year from the IID–MWD Conservation Program for MWD over a period of up to approximately 75 years.

Table 1 summarizes the yields and estimated start dates of the core cooperative voluntary water conservation/transfer projects and associated exchanges:

TABLE 1.—COOPERATIVE WATER CONSERVATION/TRANSFER PROJECTS

Cooperative water conservation/transfer projects	Annual yield (af)	Estimated start date
MWD/IID 1988 Water Conservation Program	100,000–110,000[2]	([1])
SDCWA/IID Transfer and SDCWA/MWD Exchange	130,000–200,000[3]	2002
MWD/CVWD SWP Water Transfer/Colorado River Water Exchange	35,000	2003
Coachella Canal Lining-MWD/SLR[4]	26,000	[5]2005
All American Canal Lining-MWD/SLR[3]	367,700	[4]2006

TABLE 1.—COOPERATIVE WATER CONSERVATION/TRANSFER PROJECTS—Continued

Cooperative water conservation/transfer projects	Annual yield (af)	Estimated start date
IID/CVWD/MWD Conservation Program	100,000 [6]	2007

[1] Complete.
[2] Yield to MWD, except for 20,000 af per year to be made available to CVWD.
[3] Yield to SDCWA.
[4] Yield to MWD and San Luis Rey Indian Water Rights Settlement Parties.
[5] Date by which full conservation benefits will be achieved.
[6] Yield to CVWD, MWD has an option to acquire water CVWD does not need. MWD assumes responsibility for 50,000 af per year to CVWD after year 45 of the Settlement Agreement.

The agencies' Colorado River entitlement water use budgets are adjusted for each increment of transfer, resulting in an overall reduced use of Colorado River water by California. There is approximately a 20-year transition period before the core water conservation/transfers are fully implemented. All of the core conservation/transfers to the coastal plain of southern California are proposed to occur within a ten-year implementation period.

The agencies responsible for implementing the components of the Plan intend to move forward as quickly as possible. In a number of cases, environmental documentation must be prepared and, in certain cases, permits and approvals must be secured from state and/or federal agencies to permit projects to move forward. It should be understood that some components and/or associated components may be modified but would still produce the same conceptual results, or that other options may be substituted if they are found to be more effective and appropriate. There are also related activities, such as the Salton Sea (the ''Sea'') restoration efforts. Congress specified in Public Law 105–372 that alternatives to restore the Sea should not include importation of any new or additional water from the Colorado River and should account for the transfer of water out of the Salton Sea Basin.

The Plan also includes consideration of environmental factors. Implementation of the Plan will reduce California's reliance on the Colorado River without severe dislocations in either urban or agricultural areas. Fundamentally, programs and projects in the Plan are not designed to increase water supplies to accommodate increased population growth. Thus, their implementation will not stimulate new growth, foster unplanned urban development, affect demands on local or regional transportation systems, require new public services and utilities, or create long-term increases in ambient noise levels. Their implementation will make a *de minimis* contribution to cumulative land use impacts and have a *de minimis* effect on associated socioeconomic resources, such as employment, earnings, and housing. The Plan and the accompanying Settlement Agreement programs and projects are designed to preserve the ability to meet existing needs while diverting less water from the Colorado River.

In accordance with the Plan, California's use of Colorado River water during the Interim Period will decline over time. During the Interim Period (2002–2016), MWD will use surplus water, when available, to meet direct water supply demands on the coastal plain while programs and projects in the Plan are implemented, as well as to provide a source of water for conjunctive use and storage programs. Following the Interim Period, beyond 2016, MWD's water supply demands will be met from occasional years of surplus water, conjunctive use and storage withdrawals, dry year transfers, and other water acquisitions.

California expects to have the projects shown in Table 1 yield the following amounts of water in the years shown:

Date	Acre feet
2006	340,000
2011	460,000
2016	490,000
2021	510,000
2026	540,000

II. Authority and Purpose

The purpose of these Guidelines is to provide direction for an Interim Period for the annual determination by the Secretary of Normal, Surplus, and Shortage conditions for the pumping or release from Lake Mead of mainstream water downstream from Lee Ferry for use in the Lower Division States. These Guidelines are used under the authority of the Boulder Canyon Project Act of 1928 (28 Stat. 1057) (the ''BCPA''), the Decree in *Arizona* v. *California,* 376 U. S. 340 (1964) (the ''Decree'') and in furtherance of Article III of the *Criteria for the Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (P.L. 90–537)* (the ''Criteria''). Additionally, these Guidelines rely on the authority of the Secretary to make apportioned but unused water in one Lower Division State available for use for irrigation and domestic uses in another state under Article II(B)(6) of the Decree. These Guidelines are adopted for the purpose of providing enhanced domestic water supply reliability in the Lower Division States during a transition period ending December 31, 2016 (the ''Interim Period''), in accordance with the priorities contained in water delivery contracts or agreements.

These Guidelines become effective only when the Settlement Agreement becomes effective. The Guidelines include triggers that will implement Normal, Surplus or Shortage deliveries at specified target elevations of storage in Lake Mead. They also include benchmarks, reporting mechanisms and reviews by which California and agencies within California will demonstrate measurable and defined progress in meeting the goals of the California's Plan described herein. If sufficient progress is not being made, these Guidelines will automatically terminate.

The State of California and its affected agencies have recognized and agreed upon, and the Secretary has agreed with, the plan for implementation of agreements that will increase the efficiency of use within Priorities 1 through 3 of the California Seven-Party Agreement of August 18, 1931, and thereby reduce the amount of water required for irrigation and potable uses under such priorities. Savings shall be made available for use on the coastal plain of Southern California within California's basic annual apportionment of 4.4 maf.

These Guidelines include measures to be undertaken by MWD to provide reparation to Arizona for increased water supply shortages associated with interim operations, both during the

effective period and for so long thereafter as such risk is present. During the Interim Period and after the termination of these Guidelines, the Secretary will withhold, deliver and account for water in accordance with such described reparation.

These Guidelines are not intended to, and do not:

- Guarantee or assure any water user a firm supply for any specified period;
- Change or expand existing authorities under the body of law known as the ''Law of the River'';
- Address intrastate storage or intrastate distribution of water;
- Change the apportionments made for use within individual States, or in any way impair or impede the right of the Upper Basin to consumptively use water available to that Basin under the Compact;
- Affect any obligation of any Upper Division State under the Colorado River Compact;
- Affect any right of any State or of the United States under § 14 of the Colorado River Storage Project Act of 1956 (70 Stat. 105); § 601(c) of the Colorado River Basin Project Act of 1968 (82 Stat. 885); the California Limitation Act (Act of March 4, 1929; Ch. 16, 48th Sess.); or any other provision of the ''Law of the River''; or
- Affect the rights of any holder of present perfected rights or reserved rights, which rights shall be satisfied within the apportionment of the State within which the use is made in accordance with the Decree.

For purposes of these guidelines, the following definitions do apply:

''Domestic'' use shall have the meaning defined in the Compact. ''Direct Delivery Domestic Use'' shall mean direct delivery of water to domestic end users of other municipal and industrial water providers within the contractor's area of normal service, including incidental regulation of Colorado River water supplies within the year of operation but not including Off-stream Banking. ''Direct Delivery Domestic Use'' for MWD shall include delivery of water to end users within its area of normal service, incidental regulation of Colorado River water supplies within the year of operation, and Off-stream Banking only with water delivered through the Colorado River Aqueduct. ''Off-stream Banking'' shall mean the diversion of Colorado River water to underground storage facilities for use in subsequent years from the facility used by a contractor diverting such water.

III. Allocation of Unused Apportionment Water Under Article II(B)(6)

Article II(B)(6) of the Decree allows the Secretary to allocate water that is apportioned to one Lower Division State, but is for any reason unused in that State, to another Lower Division State. This determination is made for one year only and no rights to recurrent use of the water accrue to the state that receives the allocated water. Historically, this provision of the Decree has been used to allocate Arizona's and Nevada's apportioned but unused water to California.

Water use projections made for the analysis of these interim Guidelines indicate that neither California nor Nevada is likely to have significant volumes of apportioned but unused water during the Interim Period. Depending upon the requirements of the AWBA for intrastate and interstate Off-Stream Banking, Arizona may have significant amounts of apportioned but unused water.

Before making a determination of an interim Surplus condition under these Guidelines, the Secretary will determine the quantity of apportioned but unused water from the basic apportionments under Article II(B)(6), and will allocate such water in the following order of priority:

1. Meet the Direct Delivery Domestic Use requirements of Metropolitan Water District of Southern California (''MWD'') and Southern Nevada Water Authority (''SNWA''), allocated as agreed by said agencies;

2. Meet the needs for Off-stream Banking activities in California by MWD and in Nevada by SNWA, allocated as agreed by said agencies; and

3. Meet the other needs for water in California in accordance with the California Seven-Party Agreement as supplemented by the Settlement Agreement.

IV. Determination of Lake Mead Operation During the Interim Period

A. Normal

In years when available Lake Mead storage is projected to be at or below elevation 1,125 ft. and above the Shortage triggering level on January 1, the Secretary shall determine a Normal year.

B. Surplus

1. *Partial Domestic Surplus:* In years when Lake Mead storage is projected to be between elevation 1125 ft. and elevation 1145 ft. on January 1, the Secretary shall determine a Partial Domestic Surplus. The amount of such Surplus shall equal:

a. For Direct Delivery Domestic Use by MWD, 1.212 maf reduced by: 1.) the amount of basic apportionment available to MWD and 2.) the amount of its domestic demand which MWD offsets in such year by offstream groundwater withdrawals or other options. The amount offset under 2.) shall not be less than 400,000 af in 2001 and will be reduced by 20,000 af/yr over the Interim Period so as to equal 100,000 af in 2016.

b. For use by SNWA, one-half of the Direct Delivery Domestic Use within the SNWA service area in excess of the State of Nevada's basic apportionment.

c. For Arizona, one-half of the Direct Delivery Domestic Use in excess of the State of Arizona's basic apportionment.

2. *Full Domestic Surplus:* In years when Lake Mead content is projected to be above elevation 1145 ft., but less than the amount which would initiate a Surplus under B.3 or B.4 hereof on January 1, the Secretary shall determine a Full Domestic Surplus. The amount of such Surplus shall equal:

a. For Direct Delivery Domestic Use by MWD, 1.250 maf reduced by the amount of basic apportionment available to MWD.

b. For use by SNWA, the Direct Delivery Domestic Use within the SNWA service area in excess of the State of Nevada's basic apportionment.

c. For use in Arizona, the Direct Delivery Domestic Use in excess of Arizona's basic apportionment.

3. *Quantified Surplus:* In years when the Secretary determines that water should be released for beneficial consumptive use to reduce the risk of potential reservoir spills based on the OS 0.70 alternative strategy (''70R'') as described in the Bureau of Reclamation's *CRSSez Annual Colorado River System Simulation Model Overview and Users Manual,* revised May 1998, the Secretary shall determine and allocate a Quantified Surplus sequentially as follows:

a. Establish the volume of the Quantified Surplus.

b. Allocate and distribute the Quantified Surplus 50% to California, 46% to Arizona and 4% to Nevada, subject to c. through g. that follow.

c. Distribute California's share first to meet basic apportionment demands and MWD's Direct Delivery Domestic Use and Off-stream Banking demands, and then to California Priorities 6 and 7 and other surplus contracts. Distribute Nevada's share first to meet basic apportionment demands and then to the remaining Direct Delivery Domestic Use and Off-stream Banking demands.

Distribute Arizona's share to surplus demands in Arizona including Off-stream Banking and interstate banking demands. Arizona, California and Nevada agree that Nevada would get first priority for interstate banking in Arizona.

d. Distribute any unused share of the Quantified Surplus in accordance with Section III, *Allocation of Unused Apportionment Water Under Article II(B)(6).*

e. Determine whether MWD, SNWA and Arizona have received the amount of water they would have received under Section IV.B.2., *Full Domestic Surplus* if a Quantified Surplus had not been declared. If they have not, then determine and meet all demands provided for in Section IV.B.2. (a), (b) and (c).

f. Any remaining water shall remain in storage in Lake Mead.

4. *Flood Control Surplus:* In years in which the *Field Working Agreement between the Bureau of Reclamation and the Army Corps of Engineers for Flood Control Operation of Hoover Dam and Lake Mead* requires releases greater than the downstream beneficial consumptive use demands, the Secretary shall determine a Flood Control Surplus in that year or the subsequent year. In such years, releases will be made to satisfy all beneficial uses within the United States, including unlimited off-stream groundwater banking, and section 215 deliveries under the Reclamation Reform Act of 1982 (96 Stat. 1263) (the ''RRA''). After all beneficial uses within the United States have been met, the Secretary shall notify the United States Section of the International Boundary and Water Commission that there may be a surplus of water as provided in Article 10 of the Mexican Water Treaty of 1944.

C. Shortage

In a year when the Secretary projects that future water supply and demands would create a 20% or greater probability that Lake Mead would drop below elevation 1050 feet in a year prior to or in the year 2050, the Secretary shall determine a Shortage. This strategy is defined in the Bureau of Reclamation's *CRSSez Annual Colorado River System Simulation Model Overview and Users Manual,* revised May 1998. In any year when a shortage is declared, the Secretary shall deliver no more than 4.4 maf for consumptive use in California and no more than 2.3 maf for consumptive use in Arizona. Nevada shall share in shortages as required by law. If reservoir conditions continue to deteriorate, the Secretary may require additional reductions in accordance with the Decree and law.

V. Determination of 602(a) Storage in Lake Powell During the Interim Period

During the Interim Period, 602(a) storage requirements determined in accordance with Article II (1) of the Criteria shall utilize a value of not less than 14.85 maf (elevation 3630 feet) for Lake Powell.

VI. Implementation of Guidelines

During the Interim Period the Secretary shall utilize the currently established process for development of the Annual Operating Plan for the Colorado River System Reservoirs (''AOP'') and use these Guidelines to make determinations regarding Normal, Surplus, and Shortage conditions for the operation of Lake Mead and to allocate apportioned but unused water. The Secretary also shall apply, as appropriate, the provisions of these Guidelines related to reparation and termination. The operation of the other Colorado River System reservoirs and determinations associated with development of the AOP shall be in accordance with the Colorado River Basin Project Act of 1968, the Criteria, and other applicable laws.

In order to allow for better overall water management during the Interim Period, the Secretary shall undertake a ''mid-year review'' allowing for the revision of the current AOP, as appropriate based on actual runoff conditions which are greater than projected, or demands which are lower than projected. The Secretary shall revise the determination for the current year only to allow for additional deliveries. Any revision in the AOP may occur only after a re-initiation of the AOP consultation process as required by law.

As part of the AOP process during the Interim Period, California shall report to the Secretary on its progress in implementing the Plan.

VII. Reparation for Increased Water Supply Shortages

It is possible that the operation of Lake Mead under these Guidelines will result in the Secretary determining a shortage condition more frequently, or for a shortage to be more severe, or for a shortage to be longer in duration than would otherwise have occurred, during the Interim Period or thereafter. During the Interim Period, if the Secretary makes a shortage determination in which deliveries to Arizona would be reduced, and if MWD has diverted water under IV. B.1 and/or IV. B.2 herein, MWD has agreed to forbear the delivery off the River of 500,000 af per year, unless otherwise agreed by MWD and Arizona. The holders of Priorities 6 and 7 under the California Seven-Party Agreement and Nevada have waived any claim to such water. After the Interim Period, if the Secretary makes a shortage determination in which deliveries to Arizona would be reduced and, if MWD has diverted water under IV. B.1 and/or IV. B.2 herein, MWD has agreed to forbear the delivery off the river of an amount of water equal to such reductions to Arizona, unless otherwise agreed by MWD and Arizona. The holders of Priorities 6 and 7 under the California Seven-Party Agreement and Nevada have waived any claim to such water.

The total amount of water forborne by MWD during or after the Interim Period pursuant to these guidelines shall not exceed one maf.

The reparation obligation of MWD shall terminate at such time after the Interim Period that the Secretary determines a Surplus based on the Flood Control strategy or as otherwise agreed by MWD and Arizona.

VIII. Termination of Guidelines

These Guidelines shall terminate:

A. On December 31, 2016, or

B. In the event California has not implemented conservation measures as set forth in the Settlement Agreement, which actually reduce its need for surplus Colorado River water by the following amounts by the date indicated:

Date	Acre feet
January 1, 2006	280,000
January 1, 2011	380,000

In such event, the Bureau of Reclamation shall account for the total volume of Colorado River water diverted into underground storage from the Colorado River Aqueduct by and for the benefit of MWD under any Full Domestic Surplus determination. MWD has agreed to forbear diversions in an amount equal to such volume in the next following Normal or Shortage year(s) in an amount not to exceed 200,000 af per year, and the holders of Priorities 6 and 7 under the California Seven-Party Agreement have waived any claim to such water. Such obligation shall be terminated in the first year that the Secretary determines a Surplus under a 70R strategy or a Flood Control strategy.

Upon termination, Lake Mead operations, for the purpose of determining Surplus, shall immediately revert to 70R. Note: We will prepare a

separate document describing inadvertent overruns and average decree accounting that may be incorporated into the criteria or adopted separately.''

Dated: August 3, 2000.

Eluid L. Martinez,

Commissioner, Bureau of Reclamation.

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DEPARTMENT OF JUSTICE

Lodging of Consent Decrees Under the Comprehensive Environmental Response, Compensation and Liability Act (''CERCLA'')

Notice is hereby given that nine proposed consent decrees in *United States* v. *Mountain Metal Company, et al.,* Civil Action No. CV–98–C–2562–S, and consolidated action *Exide Corporation and Johnson Controls, Inc.* v. *Aaron Scrap Metals, et al.,* Civil Action No. CV–98–J–2886–S, were lodged on August 1, 2000 with the United States District Court for the Northern District of Alabama, Southern Division.

In these actions, the United States has sought recovery of response costs under section 107 of CERCLA, 42 U.S.C. 9607, and Exide Corporation and Johnson Controls, Inc. have sought recovery of response costs under section 113 of CERCLA, 42 U.S.C. 9613, against over forty defendants with respect to the Interstate Lead Company (''ILCO'') Superfund Site, located in Leeds, Jefferson County, Alabama (''the Site'').

The United States has now agreed to settlement of its claims under sections 106 and 107 of CERCLA, 42 U.S.C. 9606 and 9607, for existing contamination at the Site with respect to nine defendants: (1) Arch Metals, Inc.; (2) Del's Metals Co., Inc.; (3) Harry Gordon Scrap Materials, Inc.; (4) Kar-Life Battery Company, Inc.; (5) Lead Products Co., Inc.; (6) Mixon, Inc.; (7) Mountain Metal Company, Inc.; (8) T.A. Pollack Co., Inc.; and (9) Wooster Iron & Metal Company f/k/a Metallics Recycling, Inc. Under the consent decrees, the companies will pay the following amounts to the United States: (1) $17,000 for Arch Metals, Inc.; (2) $20,400 for Del's Metals, Inc.; (3) $83,640 for Harry Gordon Scrap Materials, Inc.; (4) $11,560 for Kar-Life Battery Company, Inc.; (5) $90,870 for Lead Products Co., Inc.; (6) $17,820 for Mixon, Inc.; (7) $170,000 for Mountain Metal Company, Inc.; (8) $14,500 for T.A. Pollack Co., Inc. and (9) $63,933 for Wooster Iron & Metal Company f/k/a Metallics Recycling, Inc.

The Department of Justice will receive, for a period of thirty (30) days from the date of this publication, comments relating to the proposed consent decrees. Comments should be addressed to the Assistant Attorney General of the Environment and Natural Resources Division, P.O. Box 7611, Department of Justice, Washington, D.C. 20044, and should refer to *United States* v. *Mountain Metal Company, et al.,* Civil Action No. CV–98–C–2562–S, and consolidated action *Exide Corporation and Johnson Controls, Inc.,* v. *Aaron Scrap Metals, et al.,* Civil Action No. CV–98–J–2886–S, and DOJ # 90–11–2–108/2.

Any of the proposed consent decrees may be examined at the Office of the United States Attorney, Northern District of Alabama, 200 Robert S. Vance Federal Building & Courthouse, 1800 5th Ave. N., Room 200, Birmingham, AL 35203–2198, and at U.S. EPA Region 4, Atlanta Federal Center, 61 Forsyth Street, S.W. Atlanta, Georgia 30303. A copy of any of the proposed Consent Decrees also may be obtained by mail from the Department of Justice Consent Decree Library, P.O. Box 7611, Washington, D.C. 20044. In requesting a copy, please enclose a check in the amount of $8.00 (25 cents per page reproduction costs) per Consent Decree, payable to the Consent Decree Library.

Bruce S. Gelber,

Deputy Chief, Environmental Enforcement Section, Environment and Natural Resources Division.

[FR Doc. 00–19950 Filed 8–7–00; 8:45 am]

BILLING CODE 4410–15–M

NUCLEAR REGULATORY COMMISSION

[Docket No. 040–08778]

Finding of No Significant Impact Related to Amendment of Source Materials License SMB–1393 Molycorp. Inc., Washington, PA, Facility

The U.S. Nuclear Regulatory Commission (NRC) is considering issuing an amendment to Source Materials License No. SMB–1393 issued to Molycorp, Inc. (Molycorp or licensee), to authorize decommissioning of its facility in Washington, Pennsylvania. In preparation for cleanup of the site, Molycorp submitted its initial decommissioning plan (DP) to the NRC in July 1995. The DP has been supplemented twice: (1) First on June 30, 1999, (DP Part 1) to reflect the licensee's intent to decommission a portion of the site using cleanup criteria contained in NRC's ''Action Plan to Ensure Timely Cleanup of Site Decommissioning Management Plan Sites'' (SDMP Action Plan) (57 **Federal Register** 13389); and (2) on July 14, 2000, (DP part 2) for that portion of the site intended to meet the requirements of the License Termination Rule (LTR) in 10 CFR part 20, Subpart E, ''Radiological Criteria for License Termination,'' published in July 1997 (62 **Federal Register** 39057).

Environmental Assessment Summary

This Environmental Assessment (EA) addresses only the part 1 decommissioning. Part 2 will be the subject of a separate evaluation. Under the Part 1 DP (hereafter, decommissioning plan) Molycorp, Inc., will remediate contaminated soils on the main facility grounds and at a separate location where slag materials have been concentrated by past operations (*i.e.*, slag pile) to unrestricted release levels. The decision to dispose of the materials on site will be addressed in part 2.

This EA reviews the environmental impacts of the decommissioning actions proposed by Molycorp, Inc. in the decommissioning plan (part 1) for its facility located in Washington, Pennsylvania. In connection with the review of plans for the proposed action, NRC staff is preparing a safety evaluation report (SER), that evaluates compliance of the proposed action with NRC regulations. On issuance, the SER will be available in NRC's Electronic Reading Room, on NRC's Web site *http://www.nrc.gov/adams/index.html.*

Proposed Action

The decommissioning activities proposed by Molycorp include:

- Identify the location, depth, and thickness of areas containing greater than 10 picoCuries per gram (0.37 Becquerels per gram) total thorium.
- Mobilize equipment, set up decontamination facilities, and implement erosion control measures in preparation for excavation activities.
- Survey the site area to establish spatial coordinates of contaminated areas identified from site characterization radiological surveys.
- Excavate clean overburden and stockpile onsite.
- Excavate all soil and slag containing average contamination levels in excess of the unrestricted use criteria.
- Stockpile excavated material in preparation for loading onto transports. Stockpiling duration is estimated at two weeks. Excavation and stockpiling of waste will not occur until NRC has approved a disposal location for the waste.

- Imperial Public Library, 200 W. 9th Street, Imperial, California; telephone: (760) 355–1332
- Indio Branch Library, 200 Civic Center Mall, Indio, California; telephone: (760) 347–2383
- Palm Springs Library, 300 S. Sunrise Way, Palm Springs, California; telephone: (760) 322–7323
- San Diego Central Library, 820 E Street, San Diego, California; telephone: (619) 236–5800
- Los Angeles Public Library, 630 W. Fifth Street, Los Angeles, California 90071; telephone: (213) 228–7000

SUPPLEMENTARY INFORMATION: This DEIS/DEIR is a revised and updated version of a DEIS/DEIR for the Coachella Canal Lining Project filed by Reclamation and the CVWD and issued for public comment on January 11, 1994. At that time, because of funding constraints, construction of the project was deferred, and a Final EIS/EIR was not completed. The proposed action evaluated in the revised DEIS/DEIR is the same as in the previous document—to install a concrete lining within the existing cross-section of unlined portions of the canal (33.2 miles) using conventional construction methods and diverting water around each section while it is being lined. Alternatives evaluated in the DEIS/DEIR, also the same as in the original DEIS/DEIR, include No Action, Underwater Lining, and Parallel Canal Construction.

The purpose of this federal action is to conserve 30,850 acre-feet annually of water presently being lost as seepage from the earthen reaches of the Coachella Canal. A specific quantity of conserved water would be assigned to the Department of the Interior to facilitate implementation of the San Luis Rey Indian Water Rights Settlement Act (Public Law 100–675, November 17, 1988). Remaining quantities of conserved water would be distributed to southern California to meet present water demand and to assist the State in attaining the goals of California's Colorado River Water Use Plan. The federal action includes approval of transfers and exchanges of conserved Coachella canal water among California's Colorado River water contractors.

Dated: September 13, 2000.

Robert W. Johnson,

Regional Director.

[FR Doc. 00–24425 Filed 9–21–00; 8:45 am]

BILLING CODE 4310–MN–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Colorado River Interim Surplus Criteria; Correction

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of correction to published **Federal Register** notice of availability.

SUMMARY: The Bureau of Reclamation is correcting information published in the **Federal Register** issue date of Tuesday, August 8, 2000 (Vol. 65, No. 153).

FOR FURTHER INFORMATION CONTACT: For additional information, contact Ms. Jayne Harkins at (702) 293–8785.

SUPPLEMENTARY INFORMATION: On page 48534, in Table 1., ''Cooperative Water Conservation/Transfer Projects'', under the column labeled ''Cooperative water conservation/transfer projects'', the footnote for ''All American Canal Lining-MWD/SLR'' should be ''4'' instead of ''3.'' In the ''Estimated start date'' column of the same table, the footnote for year ''2006'' should be ''5'' instead of ''4.''

On page 48536, in the far right column, subsection ''IV.D.3.d.'' should read ''Allocate and distribute the Quantified Surplus 50% to California, 46% to Arizona and 4% to Nevada subject to a. though f. that follow.'' instead of ''* * * subject to c. though g. that follow.''

Dated: September 15, 2000.

Robert W. Johnson,

Regional Director.

[FR Doc. 00–24424 Filed 9–21–00; 8:45 am]

BILLING CODE 4310–MN–P

DEPARTMENT OF THE INTERIOR

Office of Surface Mining Reclamation and Enforcement

Notice of Proposed Information Collection

AGENCY: Office of Surface Mining Reclamation and Enforcement.

ACTION: Notice and request for comments.

SUMMARY: In compliance with the Paperwork Reduction Act of 1995, the Office of Surface Mining Reclamation and Enforcement (OSM) is announcing its intention to renew its authority to collect information for the permanent program inspection and enforcement procedures at 30 CFR Part 840.

DATES: Comments on the proposed information collection must be received by November 21, 2000, to be assured of consideration.

ADDRESSES: Comments may be mailed to John A. Trelease, Office of Surface Mining Reclamation and Enforcement, 1951 Constitution Ave., NW., Room 210–SIB, Washington, DC 20240. Comments may also be submitted electronically to jtreleas@osmre.gov.

FOR FURTHER INFORMATION CONTACT: To request a copy of the information collection request, explanatory information and related form, contact John A. Trelease, at (202) 208–2783.

SUPPLEMENTARY INFORMATION: The Office of Management and Budget (OMB) regulations at 5 CFR 1320, which implement provisions of the Paperwork Reduction Act of 1995 (Pub. L. 104–13), require that interested members of the public and affected agencies have an opportunity to comment on information collection and recordkeeping activities [see 5 CFR 1320.8 (d)]. This notice identifies information collections that OSM will be submitting to OMB for extension. This collection is contained in 30 CFR 840.

OSM has received burden estimates, where appropriate, to reflect current reporting levels or adjustments based on reestimates of burden or respondents. OSM will request a 3-year term of approval for this information collection activity.

Comments are invited on: (1) The need for the collection of information for the performance of the functions of the agency; (2) the accuracy of the agency's burden estimates; (3) ways to enhance the quality, utility and clarity of the information collection; and (4) ways to minimize the information collection burden on respondents, such as use of automated means of collection of the information. A summary of the public comments will accompany OSM's submission of the information collection request to OMB.

This notice provides the public with 60 days in which to comment on the following information collection activity:

Title: Permanent Program Inspection and Enforcement Procedures, 30 CFR Part 840.

OMB Control Number: 1029–0051.

Abstract: This provision requires the regulatory authority to conduct periodic inspections of coal mining activities, and prepare and maintain inspection reports for public review. This information is necessary to meet the requirements of the Surface Mining Control and Reclamation Act of 1977 and its public participation provisions. Public review assures the public that the State is meeting the requirements for the

Supporting Materials

GLOSSARY

A

abutment — A structure that supports the ends of a dam or bridge.

accretion — Gradual increase in flow of a stream due to seepage, ground-water discharge, or tributary inflow.

acre-foot — Volume of water (43,560 cubic feet) that would cover one acre to a depth of one foot.

active storage — Reservoir capacity that can be used for authorized purposes.

aerate — To supply or charge with gas, usually air.

affected environment — Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.

aggradation — Process of filling and raising the level of a streambed, flood plain, or sandbar by deposition of sediment. The opposite of degradation.

algae — Simple plants containing chlorophyll; most live submerged in water.

allocation, allotment Refers to a distribution of water through which means specific persons or legal entities are assigned individual rights to consume pro rata shares of a specific quantity of water under legal entitlements. For example, a specific quantity of Colorado River water is distributed for use within each Lower Division State through an apportionment. The water available for consumptive use in that state is further distributed among water users in that state through the allocation. An allocation does not establish an entitlement; the entitlement is normally established by a written contract with the United States.

alluvium Sedimentary material transported and deposited by the action of flowing water.

ambient Surrounding natural conditions (or environment) in a given place and time.

amphibian Vertebrate animal that has a life stage in water and a life stage on land (i.e., salamanders, frogs and toads).

annual flow weighted average concentration A weighted average of monthly total dissolved solids (TDS) concentrations for a year, where the weight for each month is based on the relative flow for each month.

apportionment Refers to the distribution of water available to each Lower Division state in normal, surplus or shortage years, as set forth, respectively in Articles II (B)(1), II (B)(2) and II (B)(3) or the Decree in *Arizona v. California*.

arroyo A gully or channel cut by an ephemeral stream.

B

backwater A relatively small, generally shallow area of a river with little or no current.

banked groundwater — Water that has been stored temporarily in a groundwater aquifer. Banked groundwater can be recovered for use at a later time.

base load — Minimum load in a power system over a given period of time.

baseload plant — Powerplant normally operated to carry base load; consequently, it operates essentially at a constant load.

Basin States — The seven states referred to in the Compact as making up the Colorado River watershed; Wyoming, Colorado, Utah, Nevada, Arizona, New Mexico and California.

benthic — Bottom of rivers, lakes, or oceans; organisms that live on the bottom of water bodies.

biological opinion — Document stating the U.S. Fish and Wildlife Service and the National Marine Fisheries Service opinion as to whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.

bright line — A groundwater term; the interface between surface water and groundwater.

C

candidate species — Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the Service.

catch — At a recreational fishery, refers to the number of fish captured, whether they are kept or released. *(See harvest.)*

channel margin bar — Narrow sand deposits which continuously or discontinuously line the riverbank.

cladophora	Filamentous green alga important to the food chain in the Colorado River below Glen Canyon Dam.
Colorado River Basin	The drainage basin of the Colorado River in the United States.
Colorado River Basin Salinity Control Forum	The organization dedicated to controlling Colorado River salinity consisting of representatives of the seven Basin States
Colorado River Simulation System	An operational model of the Colorado River system based on a monthly timestep.
commercial river trip	Trip organized by a boating company that conducts tours for paying passengers.
Compact	The Colorado River Compact of 1922
compact point	The reference point designated by the Colorado River compact dividing the Upper and Lower Colorado River basins – Lee Ferry, Arizona.
Congress	United States Congress
consumptive use	The total water diversions from the Colorado River, less return flows to the river.
Cooperating Agency	With respect to the NEPA process, an agency having jurisdiction by law or special expertise concerning an aspect of a proposed project action that is requested by the Lead Agency to participate in the preparation of an Environmental Impact Statement.
coordinated operation	Generally, the operation of two or more interconnected electrical systems to achieve greater reliability and economy. As applied to hydropower resources, the operation of a group of hydropower plants to obtain optimal power benefits with due consideration for all other uses.

Court	United States Supreme Court
criteria	Standards used for making a determination.
Critical habitat	Specific areas with physical or biological features essential to the conservation of a listed species and which may require special management considerations or protection. These areas have been legally designated via *Federal Register* notices.
CRSSez	A simplified version of CRSS based on a yearly timestep.
cubic foot per second (cfs)	A measure of water flow equal to one cubic foot of water passing a point on the stream in one second of time.
cultural resource	Building, site, district, structure, or object significant in history, architecture, archeology, culture or science.

D

dead storage	Reservoir space from which stored water cannot be evacuated by gravity.
Decree	Decree entered in *Arizona v. California*
delta	Sediment deposit formed at the mouths of the Colorado River and other rivers where they enter Lake Powell, Lake Mead or the Gulf of California.
depletion	Loss of water from a stream, river, or basin resulting from consumptive use.
deposition	Settlement of material out of the water column and on to the streambed. Occurs when the energy of flowing water is unable to support the load of suspended sediment.

discharge (flow) Volume of water that passes a given point within a given period of time; expressed in this document in cfs.

dissolved oxygen (DO) Amount of free oxygen found in water; perhaps the most commonly employed measurement of water quality. Low DO levels adversely affect fish and other aquatic life. The ideal dissolved oxygen for fish life is between seven and nine mg/l; most fish cannot survive when DO falls below 3 mg/l.

drawdown Lowering of a reservoir's water level; process of depleting reservoir or groundwater storage.

E

excess flow to Mexico Flow at NIB in excess of Mexico's scheduled delivery.

ecosystems Complex system composed of a community of fauna and flora and that system's chemical and physical environments.

eddy Current of water moving against the main current in a circular pattern.

electric power system Physically connected electric generating, transmission, and distribution facilities operated as a unit under one control.

electrical demand Energy requirement placed upon a utility's generation at a given instant or averaged over any designated period of time.

endangered species A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range.

energy Electric capacity generated and/or delivered over time.

entitlement Refers to an authorization to beneficially consume Colorado River water pursuant to (1) a decreed right, (2) a contract with the United States through the Secretary of the Interior or (3) a Secretarial reservation of water.

epilimnion *See stratification.*

euphotic Of, relating to, or constituting the upper layers of a body of water into which sufficient light penetrates to permit growth of green plants.

eutrophic A body of water, often shallow, containing high concentrations of dissolved nutrients with periods of oxygen deficiency.

excess capacity Power generation capacity available on a short-term basis in excess of the firm capacity available through long-term contracts.

F

firm energy or power Non-interruptible energy and power guaranteed by the supplier to be available at all times except for reasons of uncontrollable forces or "continuity of service" contract provisions.

flood control pool Reservoir volume above the active conservation and joint-use pool that is reserved for flood runoff and then evacuated as soon as possible to keep that space in readiness for the next flood.

flow Volume of water passing a given point per unit of time expressed in cfs.

peak flow – Maximum instantaneous flow in a specified period of time.

return flow – Portion of water previously diverted from a stream and subsequently returned to that stream or to another body of water.

forage fish Generally, small fish that reproduce prolifically and are consumed by predators.

forebay Impoundment immediately above a dam or hydroelectric plant intake structure. The term is applicable to all types of hydroelectric developments (storage, run-of-river, and pumped-storage).

fry Life stage of fish between the egg and fingerling stages.

fuel replacement energy Electrical energy generated at a hydroelectric plant as a substitute for energy that would have been generated by a thermal electric plant.

full pool Volume of water in a reservoir at maximum design elevation.

G

gamete Mature egg.

gaging station Specific location on a stream where systematic observations of hydrologic data are obtained through mechanical or electrical means.

gigawatt-hour (GWh) One billion watt-hours of electrical energy.

H

headwater The source and upper part of a stream.

herbivore Animal that feeds on plants.

heterogeneous Consisting of dissimilar ingredients or constituents.

hydrology Science dealing with natural runoff and its effect on streamflow.

hydroelectric power Electrical capacity produced by falling water.

hypolimnetic zone The deep portion of a lake or reservoir volume generally classified as below the level of the thermocline.

hypolimnion *See stratification.*

I

impoundment Body of water created by a dam.

inflow Water flowing into a lake or reservoir from a river and/or its tributaries; or water entering a river from tributaries.

J-K

jeopardy opinion United States Fish and Wildlife Service or National Marine Fisheries Service opinion that an action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. The opinion includes reasonable and prudent alternatives, if any.

juvenile Young fish older than 1 year but not having reached reproductive age.

L

larval fish An immature stage that develops from the fertilized egg before assuming the characteristics of the adult.

Las Vegas Valley The topographic basin containing the City of Las Vegas, the City of North Las Vegas, the City of Henderson and certain unincorporated townships of Clark County.

Las Vegas Wash	The natural drainage channel for the entire Las Vegas Valley. It is dominated by wastewater flows from the City of Las Vegas, Clark County Sanitation District, and City of Henderson wastewater treatment plants. It terminates in the Las Vegas Bay of Lake Mead.
Law of the River	As applied to the Colorado River, a combination of federal and state statutes, interstate compacts, court decisions and decrees, federal contracts, an international treaty with Mexico and formally determined operating criteria.
Lead Agency	The agency initiating and overseeing the preparation of an environmental impact statement.
Lee Ferry	A reference point marking division between the Upper and Lower Colorado River Basins. The point is located in the mainstream of the Colorado River 1 mile below the mouth of the Paria River in Arizona.
Lees Ferry	Location of Colorado River ferry crossings (1873 to 1928) and site of the USGS stream gage above the Paria River confluence.
limnology	Scientific study of the physical characteristics and biology of lakes, ponds, and streams.
load	Amount of electrical power or energy delivered or required at a given point.
Lower Basin	The part of the Colorado River watershed below Lee Ferry, Arizona; covers parts of Arizona, California, Nevada, New Mexico and Utah.
Lower Division	A division of the Colorado River system that includes the states of Arizona, Nevada and California.

Lower Division states	Arizona, California and Nevada as defined by Article II of the *Colorado River Compact of 1922*.

M

magnitude	A number characteristic of a quantity and forming a basis for comparison with similar quantities such as flows. A number representing the intrinsic or apparent brightness of a celestial body on a logarithmic scale in which an increase of one unit corresponds to a reduction in the brightness of light by a factor of 2.512.
mean monthly flow	Average flow for the month, usually expressed in cfs.
median	Middle value in a distribution, above and below which lie an equal number of values.
megawatt (MW)	One million watts of electrical power (capacity).
megawatt-hour (MWh)	One million watt-hours of electrical energy.
mesotrophic	The intermediate level of a lake or reservoir trophic state, less productive with respect to algal biomass and nutrient levels than a eutrophic water body, but more productive than an oligotrophic lake or reservoir.
milligram per liter	Equivalent to one part per million.
Minute 242	Minute 242, August 30, 1973 of the International Boundary and Water Commission United States and Mexico pursuant to the Mexican Water Treaty. Similar to an amendment.
morphometry	A branch of limnology that deals with the morphological measurements of a lake and its basin.

N

no jeopardy opinion — United States Fish and Wildlife Service or National Marine Fisheries Service opinion that an action is not likely to jeopardized the; continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

O

off-peak energy — Electric energy supplied during periods of relatively low system demand.

oligotrophic — A body of water characterized by low dissolved plant nutrient and organic matter, and rich in oxygen at all depths.

on-peak energy — Electric energy supplied during periods of relatively high system demand.

P-Q

Pacific Institute — Pacific Institute for Studies in Development, Environment and Security.

peak load — Maximum electrical demand in a stated period of time.

pelagic — Of, relating to, or living or occurring in open water.

penstock — Conduit pipe used to convey water under pressure to the turbines of a hydroelectric plant.

percentile — A statistical term. A descriptive measure that splits ranked data into 100 parts, or hundredths. For example, the 10^{th} percentile is the value that splits the data in such a way that 10 percent of the values are less than or equal to the 10^{th} percentile.

permeability (soil)	Ease with which gasses, liquids, or plant roots penetrate or pass through a layer of soil.
$PM_{2.5}$	Particulate matter less than 2.5 microns in mean diameter.
PM_{10}	Particulate matter less than 10 microns in mean diameter.
power	Electrical capacity generated, transferred or used.
probability	In this EIS, the relative frequency with which a range of modeled values occurs. For example, the probability of Lake Mead elevation exceeding 1180 ft msl in June 2005 is equal to the number of modeled elevations greater than 1180 ft in June 2005, divided by the total number of modeled elevations in June 2005 (equal to 85 due to 85 traces being modeled).
public involvement	Process of obtaining citizen input into each stage of development of planning documents. Required as a major input into any EIS.

R

ramp rate	The rate of change in instantaneous output from a powerplant. The ramp range is established to prevent undesirable effects due to rapid changes in loading or, in the case of hydroelectric plants, discharge.
rated head	Water depth for which a hydroelectric generator and turbines were designed.
reach	A specified segment of a stream, channel, or other water conveyance.
recruitment	Survival of young plants and animals from birth to a life stage less vulnerable to environmental change.

redd Depression in river or lake bed dug by fish for the deposition of eggs.

return flow credit Water returned to the Colorado River that can be rediverted in the same year. Diverted Colorado River water that is returned to the river in the year in which it was diverted is credited against a water user's total diversions.

riffle A stretch of choppy water caused by an underlying rock shoal or sandbar.

riparian Of, on, or pertaining to the bank of a river, pond, or lake.

riparian obligate A species dependent upon riparian habitat.

RiverWare A commercial river system simulation computer program that was configured to simulate operation of the Colorado River for this EIS.

S

salinity A term used to refer to the dissolved minerals in water, also referred to as total dissolved solids.

Secchi disk Instrument used to determine the depth to which light penetrates lake water. Used as an aid to establish the euphotic zone, which marks that area of a lake where primary productivity (energy production by photosynthesis) occurs.

sediment Unconsolidated solid material that comes from weathering of rock and is carried by, suspended in, or deposited by water or wind.

sediment load Mass of sediment passing through a stream.

seepage Relatively slow movement of water through a medium, such as sand.

spawn To lay eggs, especially fish.

spawning beds Places in which eggs of aquatic animal's lodge or are placed during or after fertilization.

spills Water releases from a dam in excess of powerplant capacity.

spillway Overflow facility at a dam, usually consisting of a sill at the full-reservoir water surface elevation.

spinning reserves Available capacity of generating facilities synchronized to the interconnected electric system so that it can be called upon for immediate use in response to system problems or sudden load changes.

stage Water surface elevation.

stratification Thermal layering of water in lakes and streams. Lakes usually have three zones of varying temperature: (1) *epilimnion* – top layer with essentially uniform warmer temperature; (2) *metalimnion* – middle layer of rapid temperature decrease with depth; and (3) *hypolimnion* – bottom layer with essentially uniform colder temperatures.

T

tailwater Water immediately downstream of the outlet from a dam or hydroelectric powerplant.

thermocline The zone of maximum change in temperature in a water body, separating upper (epilimnetic) from lower (hypolimnetic) zones.

total dissolved solids (TDS)	A measure of the inorganic or mineral content of water, commonly expressed in milligrams per liter.
traditional cultural property	A site or resource that is eligible for inclusion in the *National Register of Historic Places* because of its association with cultural practices or beliefs of a living community.
tributary	River or stream flowing into a larger river or stream.
turbidity	Cloudiness of water, measure by how deeply light can penetrate into the water from the surface.

U-V

Upper Basin	The part of the Colorado River watershed above Lee Ferry, Arizona; that covers parts of Arizona, Colorado, New Mexico, Utah and Wyoming.
Upper Colorado River Commission	Commission established by the Upper Colorado River Basin Compact of appointed members from the Upper Division States whose purpose is to secure the storage of water for beneficial consumptive use in the Upper Basin.
Upper Division	A division of the Colorado River system that includes the states of Colorado, New Mexico, Utah and Wyoming.

W-X

watershed	The drainage area upstream of a specified point on a stream.

Y-Z

young-of-year	Small fish hatched from eggs spawned in the current year.

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Parry, Brian	B.S., Education, M.S., Human Resources Management, Juris Doctorate; UC Native American Affairs Program Manager	Agency Review
Peterson, Randy		Agency Review
Raulston, Barbara	M.S., Biology, B.S., Biology; 8 years exp. in wildlife mgt., habitat restoration ecology on lower CO River	Biology, Agency Review
Shrader, Thomas		Agency Review
Siano, Lorraine		Agency Review
Smith, Joe		Agency Review
Smith, Ron		Energy, Agency Review
Snow, Robert		Office of the Solicitor, Agency Review
Trueman, Dave	B.S., Biology; M.S., Biology; 20 years exp.; Program Manager, CO River Salinity Control Program; Chief, Water Quality Group	Agency Review
Verburg, Katherine	A.B., Politics; J.D., Law; 25 years legal experience; Field Solicitor	Office of the Solicitor, Agency Review

Name	Qualifications	Participation
National Park Service		
Henderson, Norm	M.S., Ecology; B.S., Biology	Recreation Data Collection, Agency Review
Burke, Bill		Recreation Data Collection, Agency Review
International Boundary and Water Commission United States and Mexico, United States Section		
Echlin, Douglas	M.S., Biological Science; B.S., Biological Science	Project Leader, EIS Coordination
Kuo, Rong	Ph.D., Civil Engineering; P.E., Civil Engineering	Technical Document Review
Robinson, James	B.S., Civil Engineering; P.E., Civil Engineering	Division Engineer, Document Review
INTERIM SURPLUS CRITERIA PROJECT TEAM		
Linser, Larry[a]	B.S., Agricultural Engineering; 25 years as specialist in surface and groundwater management, water rights and river basin operations	Project Management
Malinowski, Jay[a]	M.S., Public Administration; B.A., Sociology; 20 years in water resource management	Project Management, Description of Alternatives
Anderson, Richard[a]	B. S., Civil Engineering; 10 years in water resource planning	Modeling Analysis, Project Coordination
Argo, Regina[b]	B.S., Wildlife, Fish and Conservation Biology; 2 years terrestrial and aquatic ecological studies	Special Status Species, Critical Habitat and Other Important Habitat

Name	Qualifications	Participation
Baker, Kimberlee[a]	B.S., Animal Science/Minor Agriculture Business Management, Certificates in Word and Powerpoint	Document Production
Beckley, Michael[c]	M. A., Design; B.A., Advertising Design; 8 years directing marketing projects and designing brochures, catalogs, newsletters and websites	Graphic Design
Bohnenkamp, Pazzi[a]	25 years administrative, document preparation and word processing	Document Production
Bonoff, Michael[b]	M.S., Applied Biology; B.S., Biology; 20 years as aquatic scientist	Water Quality Analysis
Brennan, Skip[c]	M.S., Environmental Management and Policy; B.A., Geology	Contract Management
Brezack, James[b]	M.S., Environmental Science; B.S., Biology; 14 years in water resources and wastewater planning	Water Quality Analysis
Burke Trahan, Tracy[a]	A.A., Social Sciences; 15 years of document and graphic production	Document Production
Caldwell, Kathy[a]	M.A., Urban Planning and Environmental Policy Analysis; B.A., Political Science; 16 years in public policy and water resource management	Project Manager, Document Coordinator
Carter, Tom[a]	B.S., Electrical Engineering; 29 years on power and water systems operations, powerplant operations and power contracts	Socioeconomics, Power Production and Revenue

Name	Qualifications	Participation
Crabtree, Allen[a]	M.S., Resource Management; B.S., Forestry	Project Consultation
Davidson, Sandy[b]	B.S., Forest Management; 16 years in environmental science and natural resources management	Recreation
Delp, Bob[a]	B.A., Economics; Specializes in environmental impacts associated with electrical power and water facilities	Environmental Resources Analysis Coordination
Drake, Dianna[a]	22 years experience in administrative and office management	Word Processing
Einert, Martin[a]	B.S., Civil Engineering; 30 years in water project planning and evaluation	Project Setting, Alternatives, Water Supply
Goodavish, Martha[b]	M.C.R.P., City and Regional Planning; B.L.A., Landscape Architecture; 17 years in natural resource planning, recreation/visual resource management	Recreation
Hall, Timothy[a]	M.S., Civil Engineering; B.S., Civil Engineering; 3 years in water resource planning	Modeling Analysis
Harlow, Diane[a]	25 years of administrative and office management experience.	Volume I Production/Preparation
Hanna, Diane[a]	B.S., Watershed Management; 6 years exp. in water resources	Volume III Production/Preparation, Website design

Name	Qualifications	Participation
Hibbler, Thor[a]	B.S., Mechanical Engineering; B.A., Languages; 18 years in air quality and emissions permitting, compliance and auditing and air quality impact analysis	Air Quality
Lamb, Susan[a]	14 years documentation preparation/word processing	Document Coordination, Word Processing
Lawing, Carole[a]	24 years energy and water resource management	Document Production
Lee, Eric[a]	B.A., English; 5 years in geographic information services, project analysis and support	GIS Services
Lindsay, Renae[a]	6 years documentation preparation/word processing	Document Coordination, Word Processing
Morad, Armond[a]	B.S., Civil Engineering; 2 years in water resources services	Modeling Analysis
Pool, Alicia[b]	B.S., Wildlife and Fisheries Science; 9 years in endangered and sensitive species habitat analysis	Special Status Species and Habitat
Rhone, Richard[a]	B.S., Civil Engineering; 40 years in water resources development, operations, engineering and management	Project Review
Richardson, Lisa[a]	M.I.M., Master of International Management; B.S., International Business; 8 years of environmental project management and regulatory compliance	QA/QC Technical Edits
Stone, Marianne[a]	20 years administrative, document preparation and word processing	Document Production

Name	Qualifications	Participation
Strand, Bob[c]	B. S., Agricultural Engineering; 36 years in river hydraulics and sedimentation engineering	Sedimentation
Swaney, Wayne[b]	B.S., Resource Development and Water Resources; 11 years on fishery, instream flow, hydrology and watershed projects	Water Supply and Instream Flow Requirements, Special Status Species and Habitat
Valerius, Jane[b]	M.S., Range Ecology; B.A., Environmental Biology; 19 years conducting ecological, botanical and wetland studies	Special-Status Species, Critical Habitat and Other Important Habitat
Vickers, Brad[c]	B.S., Agriculture and Irrigation Engineering; 20 years exp. development of watershed and river basin computer technology; reservoir operations	Operations Modeling
Weber, Ernie[a]	B.A., Geology; 40 years in water quality, conjunctive use of ground and surface water and salinity control of Colorado River	Salinity, Water Quality
Wilcox, Scott[b]	M.Ed., Natural Resource Management; B.S. Wildlife and Fisheries Biology; 20 years in water resource analysis and fish habitat assessments	Resource Analysis, Oversight
Zoraster, John[a]	B.A., Economics; B.S., Civil Engineering; 20 years in civil, environmental and public works projects	Scoping, Flood Flows, Socioeconomic Analysis, Document Coordination

Name	Qualifications	Participation
Zubia, Ruben[a]	B.S., Civil Engineering; 14 years in water resources and civil engineering projects	Hydrological Data Analysis

[a] Staff members of Bookman-Edmonston Engineering, Water Resources Practice of Navigant Consulting, Inc.
[b] Staff members of EA Engineering, Science, & Technology, Inc.
[c] Independent subcontractors to Bookman-Edmonston Engineering, Water Resources Practice of Navigant Consulting, Inc.

DOCUMENT DISTRIBUTION

Commentors on the DEIS

Individuals

Jacqueline Garcia
Mark Belles
Verna Forbes-Willson
Eleanor Inskip
Dave Miller
Earl Zarbin

Organizations

American Water Resources, Inc.
Center for Biological Diversity (Defenders of Wildlife, Glen Canyon Institute, Glen Canyon Action Network, Pacific Institute, Environmental Defense, Sierra Club, Friends of Arizona Rivers, El Centro de Derecho Ambiental e Intergracion Economica del Sur, A.C., Fred Cagle, Jaqueline Garcia-Hernandez)
Defenders of Wildlife
Pacific Institute for Studies in Development, Environment and Security
Southwest Rivers

Water User Agencies & Organizations

Central Arizona Water Conservation District (Central Arizona Project)
Coachella Valley Water District
Colorado River Energy Distributors Association
Colorado River Water Conservation District
Cottonwood Creek Consolidated Irrigation Company
Emery Water Conservancy District
Grand Water & Sewer
Imperial Irrigation District
Irrigation and Electrical District Association of Arizona
Metropolitan Water District of Southern California
Mohave County Water Authority
Ouray Park Irrigation Company
Salt River Project
San Diego County Water Authority
Southern California Edison Company
Southern Nevada Water Authority

Water User Agencies & Organizations (Continued)

Uintah Water Conservancy District
Union Park Water Authority
Upper Colorado River Commission
Wellton-Mohawk Irrigation and Drainage District

Local Agencies

City of Phoenix, Office of the City Manager
Grand County Council, Utah

State Agencies

Arizona Power Authority (Fant)
Arizona Power Authority (Mulholland)
Arizona Department of Water Resources
Arizona Game and Fish Department
Colorado River Board of California
California Regional Water Quality Control Board
Colorado Department of Natural Resources
Nevada Department of Transportation
Nevada State Historic Preservation Office
New Mexico Environmental Department
New Mexico Interstate Stream Commission
Colorado River Commission of Nevada
Utah Department of Natural Resources, Division of Water Resources
Office of Federal Land Policy (State of Wyoming)

Tribes

Agua Calliente Band of Cahuilla Indians
Hualapai Nation
Navajo Nation Dept of Justice
Navajo Tribal Utility Authority
Ten Tribes Partnership (Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian
Tribes, Fort Mojave Indian Tribe, Jicarilla Apache Indian Tribe, Navajo Nation, Northern
Ute Indian Tribe, Quechan Indian Tribe, Southern Ute Indian Tribe, Ute Mountain Ute
Indian Tribe)
Ute Mountain Ute Tribe
Kaibab Band of Paiute Indians

Federal Agencies

Bureau of Indian Affairs, Pacific Regional Office, Sacramento
Bureau of Indian Affairs, Navajo Region, Gallup
Environmental Protection Agency, San Franscico
Fish and Wildlife Service, Phoenix
International Boundary and Water Commission - U.S. Section, El Paso
National Park Service, Washington, DC
Western Area Power Administration, Phoenix (Counsil)
Western Area Power Administration, Phoenix (Montoya)
Western Area Power Administration, Salt Lake City

Mexican Agencies/Organizations

Autonomous University of Baja California
International Boundary and Water Commission - Mexico Section
Mexicali Business Coordinating Council
Mexicali Economic Development Council
Mexico - National Water Commission

Non-Commentors

Other Tribal Contacts

Ak Chin Indian Community
Gila River Indian Community
Havasupai Tribal Council
Hopi Tribe
Mohave Apache Community Council
Paiute Indian Tribe of Utah
Pascua Yaqui Tribe
Pueblo of Zuni
San Carlos Tribal Council
San Juan Southern Paiute Tribe
Tohono Oodham Nation
Tonto Apache Tribal Council
Yavapai Apache Nation
Yavapai Prescott Tribe

Elected Officials

U.S. Senate, AZ, Senator John McCain
U.S. Senate, AZ, Senator Jon Kyl
U.S. House of Representatives, AZ, J.D. Hayworth

Elected Officials (Continued)

U.S. House of Representatives, AZ, Jim Kolbe
U.S. House of Representatives, AZ, Ed Pastor
U.S. House of Representatives, AZ, John Shadegg
U.S. House of Representatives, AZ, Matt Salmon
U.S. Senate, CA, Senator Barbara Boxer
U.S. Senate, CA, Senator Dianne Feinstein
U.S. House of Representatives, CA, Joe Baca
U.S. House of Representatives, CA, Brian Bilbray
U.S. House of Representatives, CA, Mary Bono
U.S. House of Representatives, CA, Ken Calvert
U.S. House of Representatives, CA, Randy Cunningham
U.S. House of Representatives, CA, Bob Filner
U.S. House of Representatives, CA, Duncan L. Hunter
U.S. House of Representatives, CA, Jerry Lewis
U.S. House of Representatives, CA, Ron Packard
U.S. Senate, NV, Senator Richard Bryon
U.S. Senate, NV, Senator Harry Reid
U.S. House of Representatives, NV, Shelly Berkley
U.S. House of Representatives, NV, Jim Gibbons

Libraries

Department of the Interior Natural Resources Library
Government Reference Library
Albuquerque Public Library
Boulder City Library
Denver Public Library
Henderson District Public Library
Lake Havasu City Library
Laramie County Library
LC Regional Office Library Boulder City
Los Angeles Central Library
Mohave County Library
Palo Verde Valley Library
Parker Public Library
Phoenix Concorde Commerce Center Library
Phoenix Public Library
Salt Lake City Public Library
San Bernardino County Library
San Diego Central Library
Upper Colorado Regional Office Library
Yuma Area Office Library
Yuma County Library

Colorado River Interim Surplus Criteria

Final Environmental Impact Statement

Volume II

U.S. Department of the Interior
Bureau of Reclamation
December 2000

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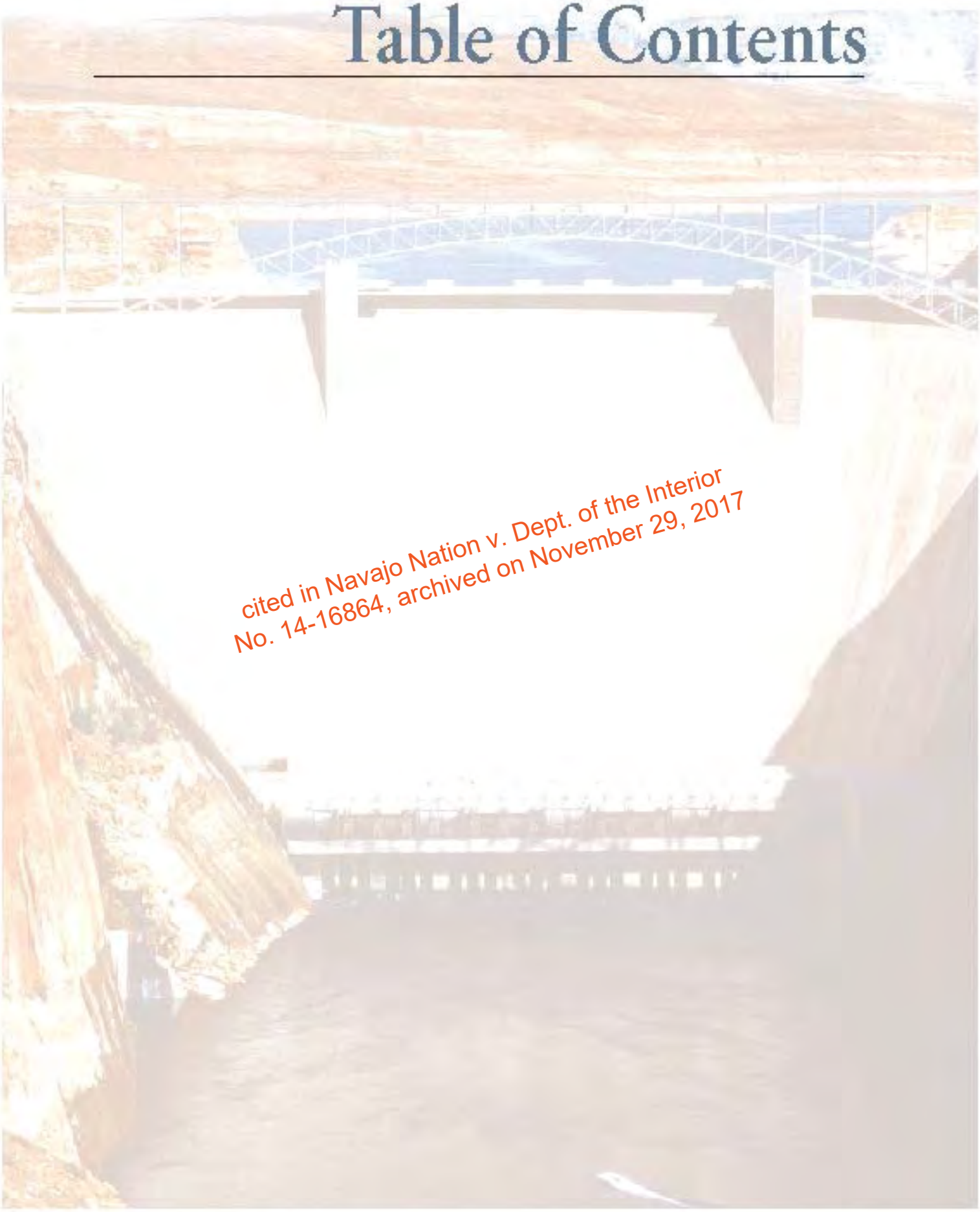

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ATTACHMENT A

Long Range Operating Criteria

This attachment consists of a document referred to as the Long Range Operating Criteria for Colorado River Reservoirs, which controls the annual determinations of Colorado River water available for delivery to the Lower Division States. This document is subject to review at five-year intervals by the Secretary in consultation with the Basin States and others as required by applicable federal law.

Long-Range Operating Criteria

CRITERIA FOR COORDINATED LONG-RANGE OPERATION OF COLORADO RIVER RESERVOIRS PURSUANT TO THE COLORADO RIVER BASIN PROJECT ACT OF SEPTEMBER 30, 1968 (P.L. 90-537)

These Operating Criteria are promulgated in compliance with Section 602 of Public Law 90-537. They are to control the coordinated long-range operation of the storage reservoirs in the Colorado River Basin constructed under the authority of the Colorado River Storage Project Act (hereinafter "Upper Basin Storage Reservoirs") and the Boulder Canyon Project Act (Lake Mead). The Operating Criteria will be administered consistent with applicable Federal laws, the Mexican Water Treaty, interstate compacts, and decrees relating to the use of the waters of the Colorado River.

The Secretary of the Interior (hereinafter the "Secretary") may modify the Operating Criteria from time to time in accordance with Section 602(b) of P.L. 90-537. The Secretary will sponsor a formal review of the Operating Criteria at least every 5 years, with participating by State representatives as each Governor may designate and such other parties and agencies as the Secretary may deem appropriate.

I. ANNUAL REPORT

(1) On January 1, 1972, and on January 1 of each year thereafter, the Secretary shall transmit to the Congress and to the Governors of the Colorado River Basin States a report describing the actual operation under the adopted criteria for the preceding compact water year and the projected plan of operating for the current year.

(2) The plan of operation shall include such detailed rules and quantities as may be necessary and consistent with the criteria contained herein, and shall reflect appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors. The projected plan of operation may be revised to reflect the current hydrologic conditions, and the Congress and the Governors of the Colorado River Basin States shall be advised of any changes by June of each year.

II. OPERATION OF UPPER BASIN RESERVOIRS

(1) The annual plan of operation shall include a determination by the secretary of the quantity of water considered necessary as of September 30 of each year to be in storage as required by Section 602(2) of P.L. 90-537 (hereinafter "602(a) Storage"). The quantity of 602(a) Storage shall be determined by the Secretary after consideration of all applicable laws and relevant factors, including, but not limited to, the following:

(a) Historic streamflows;
(b) The most critical period of record;
(c) Probabilities of water supply;
(d) Estimated future depletions in the upper basin, including the effects of recurrence of critical period of water supply;
(e) The "Report of the Committee on Probabilities and Test Studies to the Task Force on Operating Criteria for the Colorado River," dated October 30, 1969, and such additional studies as the Secretary deems necessary;
(f) The necessity to assure that upper basin consumptive uses not be impaired because of failure to store sufficient water to assure deliveries under Section 602(a)(1) and (2) of P.L. 90-537.

(2) If in the plan of operation, either:

(a) The Upper Basin Storage Reservoirs active storage forecast for September 30 of the current year is less than the quantity of 602(a) Storage determined by the Secretary under Article II(1) hereof, for that date;
(b) The Lake Powell active storage forecast for that date is less than the Lake Mead active storage forecast for that date:

> The objective shall be to maintain a minimum release of water from Lake Powell of 8.23 million acre-feet for that year. However, for the years ending September 30, 1971 and 1972, the release may be greater than 8.23 million acre-feet if necessary to deliver 75,000,000 acre-feet at Lee Ferry for the 10-year period ending September 30, 1972.

(3) If, in the plan of operation, the Upper Basin Storage Reservoirs active storage forecast for September 30 of the current water year is greater than the quantity of 602(a) Storage determination for that date, water shall be released annually from Lake Powell at a rate greater than 8.23 million

acre-feet per year to the extent necessary to accomplish any or all of the following objectives:

(a) To the extent it can be reasonably applied in the States of the Lower Division to the uses specified in Article III(e) of the Colorado River Compact, but no such releases shall be made when the active storage in Lake Powell is less than the active storage in Lake Mead;
(b) To maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell, and
(c) To avoid anticipated spills from Lake Powell.

(4) In the application of Article II(3)(b) herein, the annual release will be made to the extent that it can be passed through Glen Canyon Powerplant when operated at the available capability of the powerplant. Any water thus retained in Lake Powell to avoid bypass of water at the Glen Canyon Powerplant will be released through the Glen Canyon Powerplant as soon as practicable to equalize the active storage in Lake Powell and Lake Mead.

(5) Releases from Lake Powell pursuant to these criteria shall not prejudice the position of either the upper or lower basin interests with respect to required deliveries at Lee Ferry pursuant to the Colorado River Compact.

III. OPERATION OF LAKE MEAD

(1) Water released from Lake Powell, plus the tributary inflows between Lake Powell and Lake Mead, shall be regulated in Lake Mead and either pumped from Lake Mead or released to the Colorado River to meet requirements as follows:

(a) Mexican Treaty obligations;
(b) Reasonable consumptive use requirements of mainstream users in the Lower Basin;
(c) Net river losses;
(d) Net reservoir losses;
(e) Regulatory wastes

(2) Until such time as mainstream water is delivered by means of the Central Arizona Project, the consumptive use requirements of Article III(1)(b) of these Operating Criteria will be met.

(3) After commencement of delivery of mainstream water by means of the Central Arizona Project, the consumptive use requirements of Article

III(1)(Reclamation) of these Operating Criteria will be met to the following extent:

(a) *Normal*: The annual pumping and release from Lake Mead will be sufficient to satisfy 7,500,000 acre-feet of annual consumptive use in accordance with the decree in Arizona v. California, 376 U.S. 340 (1964).

(b) *Surplus*: The Secretary shall determine from time to time when water in quantities greater than "Normal" is available for either pumping or release from Lake Mead pursuant to Article II(b)(2) of the decree in Arizona v. California after consideration of all relevant factors, including, but not limited to, the following:

(i) the requirements stated in Article 111(1) of these Operating Criteria;
(ii) requests for water by holders of water delivery contracts with the United States, and of other rights recognized in the decree in Arizona v. California;
(iii) actual and forecast quantities of active storage in Lake Mead and the Upper Basin Storage Reservoirs; and
(iv) estimated net inflow to Lake Mead.

(c) Shortage: The Secretary shall determine from time to time when insufficient mainstream water is available to satisfy annual consumptive use requirements of 7,500,000 acre-feet after consideration of all relevant factors, including, but not limited to, the following:

(i) the requirements stated in Article III(1) of these Operating Criteria;
(ii) actual and forecast quantities of active storage in Lake Mead;
(iii) estimate of net inflow to Lake Mead for the current year;
(iv) historic streamflows, including the most critical period of record;
(v) priorities set forth in Article II(A) of the decree in *Arizona v. California*; and
(vi) the purposes stated in Article 1(2) of these Operating Criteria.

The shortage provisions of Article II(B)(3) of the decree in *Arizona v. California* shall thereupon become effective and consumptive uses from the mainstream shall be restricted to the

extent determined by the Secretary to be required by Section 301(b) of Public Law 90-537.

IV. DEFINITIONS

(1) In addition to the definitions in Section 606 of P.L. 90-537, the following shall also apply:

(a) "Spills," as used in Article II(3)(c) herein, means water released from Lake Powell which cannot be utilized for project purposed, including, but not limited to, the generation of power and energy.

(b) "Surplus," as used in Article III(3)(b) herein, is water which can be used to meet consumptive use demands in the three Lower Division States in excess of 7,500,000 acre-feet annually. The term "surplus" as used in these Operating Criteria is not to be construed as applied to, being interpretive of, or in any manner having reference to the term "surplus" in the Colorado River Compact.

(c) "Net inflow to Lake Mead," as used in Article III(b)(iv) and (c)(iii) herein, represents the annual inflow to Lake Mead in excess of losses from Lake Mead.

(d) "Available capability," as used in Article II(4) herein, means that portion of the total capacity of the powerplant that is physically available for generation.

ATTACHMENT B

Environmental Guidelines for Transboundary Impacts

This attachment contains federal instruction and guidelines governing the analysis of the Transboundary Impacts in Section 3.16 of the FEIS. Two documents are included – Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions,* and *Council on Environmental Quality Guidance on NEPA Analysis for Transboundary Impacts,* July 1, 1997.

Executive Order 12114 - Environmental Effects Abroad of Major Federal Actions

Exec. Order No. 12114
44 Federal Register 1957
1979 WL 25866 (Pres.)

Executive Order 12114

Environmental Effects Abroad of Major Federal Actions

January 4, 1979

By virtue of the authority vested in me by the Constitution and the laws of the United States, and as President of the United States, in order to further environmental objectives consistent with the foreign policy and national security policy of the United States, it is ordered as follows:

Section 1.

1-1. Purpose and Scope. The purpose of this Executive Order is to enable responsible officials of Federal Agencies having ultimate responsibility for authorizing and approving actions encompassed by this Order to be informed of pertinent environmental considerations and to take such considerations into account, with other pertinent considerations of national policy, in making decisions regarding such actions. While based on independent authority, this Order furthers the purpose of the National Environmental Policy Act and the Marine Protection Research and Sanctuaries Act and the Deepwater Port Act consistent with the foreign policy and national security policy of the United States, and represents the United States government's exclusive and complete determination of the procedural and other actions to be taken by Federal agencies to further the purpose of the National Environmental Policy Act, with respect to the environment outside the United States, its territories and possessions.

Sec. 2.

2-1. Agency Procedures. Every Federal agency taking major Federal actions encompassed hereby and not exempted herefrom having significant effects on the environment outside the geographical borders of the United States and its territories and possessions shall within eight months after the effective date of this Order have in effect procedures to implement this Order. Agencies shall consult with the Department of State and the Council on Environmental Quality concerning such procedures prior to placing them in effect.

2-2. Information Exchange. To assist in effectuating the foregoing purpose, the Department of State and the Council on Environmental Quality in collaboration with other interested Federal agencies and other nations shall conduct a program for exchange on a continuing basis of information concerning the environment. The objectives of this program shall be to provide information for use by decisionmakers, to heighten awareness of and interest in environmental concerns and, as appropriate, to facilitate environmental cooperation with foreign nations.

2-3. Actions Included. Agencies in their procedures under Section 2-1 shall establish procedures by which their officers having ultimate responsibility for authorizing and approving actions in one of the following categories encompassed by this Order, take into consideration in making decisions concerning such actions, a document described in Section 2-4(a):

(a) major Federal actions significantly affecting the environment of the global commons outside the jurisdiction of any nation (e.g., the oceans or Antarctica);

(b) major Federal actions significantly affecting the environment of a foreign nation not participating with the United States and not otherwise involved in the action;

(c) major Federal actions significantly affecting the environment of a foreign nation which provide to that nation:

(1) a product, or physical project producing a principal product or an emission or effluent, which is prohibited or strictly regulated by Federal law in the United States because its toxic effects on the environment create a serious public health risk; or

(2) a physical project which in the United States is prohibited or strictly regulated by Federal law to protect the environment against

radioactive substances.

(d) major Federal actions outside the United States, its territories and possessions which significantly affect natural or ecological resources of global importance designated for protection under this subsection by the President, or, in the case of such a resource protected by international agreement binding on the United States, by the Secretary of State. Recommendations to the President under this subsection shall be accompanied by the views of the Council on Environmental Quality and the Secretary of State.

2-4. Applicable Procedures. (a) There are the following types of documents to be used in connection with actions described in Section 2-3:

(i) environmental impact statements (including generic, program and specific statements);

(ii) bilateral or multilateral environmental studies, relevant or related to the proposed action, by the United States and one or more foreign nations, or by an international body or organization in which the United States is a member or participant; or

(iii) concise reviews of the environmental issues involved, including environmental assessments, summary environmental analyses or other appropriate documents.

(b) Agencies shall in their procedures provide for preparation of documents described in Section 2-4(a), with respect to actions described in Section 2-3, as follows:

(i) for effects described in Section 2-3(a), an environmental impact statement described in Section 2-4(a)(1);

(ii) for effects described in Section 2-3(b), a document described in Section 2-4(a)(ii) or (iii), as determined by the agency;

(iii) for effects described in Section 2-3(c), a document described in Section 2-4(a)(ii) or (iii), as determined by the agency;

(iv) for effects described in Section 2-3(d), a document described in Section 2-4(a)(i), (ii) or (iii), as determined by the agency.

Such procedures may provide that an agency need not prepare a new document when a document described in Section 2-4(a) already exists.

(c) Nothing in this Order shall serve to invalidate any existing regulations of any agency which have been adopted pursuant to court order or pursuant to judicial settlement of any case or to prevent any agency from providing in its procedures for measures in addition to those provided for herein to further the purpose of the National Environmental Policy Act and other environmental laws, including the Marine Protection Research and Sanctuaries Act and the Deepwater Port Act, consistent with the foreign and national security policies of the United States.

(d) Except as provided in Section 2-5(b), agencies taking action encompassed by this Order shall, as soon as feasible, inform other Federal agencies with relevant expertise of the availability of environmental documents prepared under this Order.

Agencies in their procedures under Section 2-1 shall make appropriate provision for determining when an affected nation shall be informed in accordance with Section 3-2 of this Order of the availability of environmental documents prepared pursuant to those procedures.

In order to avoid duplication of resources, agencies in their procedures shall provide for appropriate utilization of the resources of other Federal agencies with relevant environmental jurisdiction or expertise.

2-5. Exemption and Considerations. (a) Notwithstanding Section 2-3, the following actions are exempt from this Order:

(i) actions not having a significant effect on the environment outside the United States as determined by the agency;

(ii) actions taken by the President;

(iii) actions taken by or pursuant to the direction of the President or Cabinet officer when the national security or interest is involved or when the action occurs in the course of an armed conflict;

(iv) intelligence activities and arms transfers;

(v) export licenses or permits or export approvals, and actions relating to nuclear activities except actions providing to a foreign nation a nuclear production or utilization facility as defined in the Atomic Energy Act of 1954, as amended, or a nuclear waste management facility;

(vi) votes and other actions in international conferences and organizations;

(vii) disaster and emergency relief action.

(b) Agency procedures under Section 2-1 implementing Section 2-4 may provide for appropriate modifications in the contents, timing and availability of documents to other affected Federal agencies and affected nations, where necessary to:

(i) enable the agency to decide and act promptly as and when required;

(ii) avoid adverse impacts on foreign relations or infringement in fact or appearance of other nations' sovereign responsibilities, or

(iii) ensure appropriate reflection of:

(1) diplomatic factors;

(2) international commercial, competitive and export promotion factors;

(3) needs for governmental or commercial confidentiality;

(4) national security considerations;

(5) difficulties of obtaining information and agency ability to analyze meaningfully environmental effects of a proposed action; and

(6) the degree to which the agency is involved in or able to affect a decision to be made.

(c) Agency procedure under Section 2-1 may provide for categorical exclusions and for such exemptions in addition to those specified in subsection (a) of this Section as may be necessary to meet emergency circumstances, situations involving exceptional foreign policy and national security sensitivities and other such special circumstances. In utilizing such additional exemptions agencies shall, as soon as feasible, consult with the Department of State and the Council on Environmental Quality.

(d) The provisions of Section 2-5 do not apply to actions described in Section 2-3(a) unless permitted by law.

Sec. 3.

3-1. Rights of Action. This Order is solely for the purpose of establishing internal procedures for Federal agencies of consider the significant effects of their actions on the environment outside the United States, its territories and possessions, and nothing in this Order shall be construed to create a cause of action.

3-2. Foreign Relations. The Department of State shall coordinate all communications by agencies with foreign governments concerning environmental agreements and other arrangements in implementation of this Order.

3-3. Multi-Agency Actions. Where more than one Federal agency is involved in an action or program, a lead agency, as determined by the agencies involved, shall have responsibility for implementation of this Order.

3-4. Certain Terms. For purposes of this Order, 'environment' means the natural and physical environment and excludes social, economic and other environments; and an action significantly affects the environment if it does significant harm to the environment even though on balance the agency believes the action to be beneficial to the environment. The term 'export approvals' in Section 2-5(a)(v) does not mean or include direct loans to finance exports.

3-5. Multiple Impacts. If a major Federal action having effects on the environment of the United States or the global commons requires preparation of an environmental impact statement, and if the action also has effects on the environment of a foreign nation, an environmental impact statement need not be prepared with respect to the effects on the environment of the foreign nation.

JIMMY CARTER
THE WHITE HOUSE,
January 4, 1979.

Exec. Order No. 12114
44 Federal Register 1957
1979 WL 25866 (Pres.)
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CEQ Guidance on NEPA Analyses for Transboundary Impacts

July 1, 1997

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20503

MEMORANDUM TO HEADS OF AGENCIES ON THE APPLICATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT TO PROPOSED FEDERAL ACTIONS IN THE UNITED STATES WITH TRANSBOUNDARY EFFECTS

FROM: KATHLEEN A. MCGINTY
CHAIR

DATE: JULY 1, 1997

In recent months, the Council has been involved in discussions with several agencies concerning the applicability of the National Environmental Policy Act (NEPA) to transboundary impacts that may occur as the result of proposed federal actions in the United States. To set forth a consistent interpretation of NEPA, CEQ is today issuing the attached guidance on NEPA analysis for transboundary impacts. In it, we advise that NEPA requires analysis and disclosure of transboundary impacts of proposed federal actions taking place in the United States.

We recommend that agencies which take actions with potential transboundary impacts consult as necessary with CEQ concerning specific procedures, proposals or programs which may be affected.

COUNCIL ON ENVIRONMENTAL QUALITY GUIDANCE ON NEPA ANALYSES FOR TRANSBOUNDARY IMPACTS
JULY 1, 1997

The purpose of this guidance is to clarify the applicability of the National Environmental Policy Act (NEPA) to proposed federal actions in the United States, including its territories and possessions, that may have transboundary effects extending across the border and affecting another country's environment. While the guidance arises in the context of negotiations undertaken with the governments of Mexico and Canada to develop an agreement on transboundary environmental impact assessment in North America,[1] the guidance pertains to all federal agency actions that are normally subject to NEPA, whether covered by an international agreement or not.

It is important to state at the outset the matters to which this guidance is addressed and those to which it is not. This guidance does not expand the range of actions to which NEPA currently applies. An action that does not otherwise fall under NEPA would not now fall under NEPA by virtue of this guidance. Nor does this guidance apply NEPA to so-called "extraterritorial actions", that is, U.S. actions that take place in another country or otherwise outside the jurisdiction of the United States[2]. The guidance pertains only to those proposed actions currently covered by NEPA that take place within the United States and its territories, and it does not change the applicability of NEPA law, regulations or case law to those actions. Finally, the guidance is consistent with long-standing principles of international law.

NEPA LAW AND POLICY

NEPA declares a national policy that encourages productive and enjoyable harmony

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[1] The negotiations were authorized in Section 10.7 of the North American Agreement on Environmental Cooperation, which is a side agreement to the North American Free Trade Agreement. The guidance is also relevant to the ECE Convention on Environmental Impact Assessment in a Transboundary Context, signed in Espoo, Finland in February, 1991, but not yet in force.

[2] For example, NEPA does apply to actions undertaken by the National Science Foundation in the Antarctica. Environmental Defense Fund v. Massey, 986 F.2d 528 (D.C. Cir. 1993).

between human beings and their environment, promotes efforts which will prevent or eliminate damage to the environment and biosphere, stimulates the health and welfare of human beings, and enriches the understanding of ecological systems.[3] Section 102(1) of NEPA "authorizes and directs that, to the fullest extent possible . . . . the policies, regulations and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in [the] Act."[4] NEPA's explicit statement of policies calls for the federal government "to use all practical means and measures . . . . to create and maintain conditions under which man and nature can exist in productive harmony . . . ."[5] In addition, Congress directed federal agencies to "use all practical means . . . . to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may . . . . attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences."[6] Section 102(2)(C) requires federal agencies to assess the environmental impacts of and alternatives to proposed major federal actions significantly affecting the quality of the human environment.[7] Congress also recognized the "worldwide and long-range character of environmental problems" in NEPA and directed agencies to assist other countries in anticipating and preventing a decline in the quality of the world environment.[8]

Neither NEPA nor the Council on Environmental Quality's (CEQ) regulations implementing the procedural provisions of NEPA define agencies' obligations to analyze effects of actions by administrative boundaries. Rather, the entire body of NEPA law directs federal agencies to analyze the effects of proposed actions to the extent they are reasonably foreseeable consequences of the proposed action, regardless of where those impacts might occur. Agencies

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[3] 42 USC 4321.

[4] 42 USC 4332(1).

[5] 42 USC 4331(a).

[6] 42 USC 4331(b)(3).

[7] 42 USC 4332(2)(C).

[8] 42 USC 4332(2)(F).

must analyze indirect effects, which are caused by the action, are later in time or farther removed in distance, but are still reasonably foreseeable, including growth-inducing effects and related effects on the ecosystem,[9] as well as cumulative effects.[10] Case law interpreting NEPA has reinforced the need to analyze impacts regardless of geographic boundaries within the United States,[11] and has also assumed that NEPA requires analysis of major federal actions that take place entirely outside of the United States but could have environmental effects within the United States.[12]

Courts that have addressed impacts across the United States' borders have assumed that the same rule of law applies in a transboundary context. In Swinomish Tribal Community v. Federal Energy Regulatory Commission,[13] Canadian intervenors were allowed to challenge the adequacy of an environmental impact statement (EIS) prepared by FERC in connection with its approval of an amendment to the City of Seattle's license that permitted raising the height of the Ross Dam on the Skagit River in Washington State. Assuming that NEPA required consideration of Canadian impacts, the court concluded that the report had taken the requisite "hard look" at Canadian impacts. Similarly, in Wilderness Society v. Morton,[14] the court granted intervenor status to Canadian environmental organizations that were challenging the adequacy of the trans-Alaska pipeline EIS. The court granted intervenor status because it found that there was a reasonable possibility that oil spill damage could significantly affect Canadian resources,

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[9] 40 CFR 1508.8(b).

[10] 40 CFR 1508.7.

[11] *See, for example,* Sierra Club v. U.S.Forest Service, 46 F.3d 835 (8th Cir. 1995); Resources Ltd., Inc. v. Robertson, 35 F.3d 1300 and 8 F.3d 1394 (9th Cir. 1993); Natural Resources Defense Council v. Hodel, 865 F.2d 288 (D.C. Cir. 1988); County of Josephine v. Watt, 539 F.Supp. 696 (N.D. Cal. 1982).

[12] See Sierra Club v. Adams, 578 F.2d 389 (D.C. Cir. 1978); NORML v. Dept. of State, 452 F.Supp. 1226 (D.D.C. 1978).

[13] 627 F.2d 499 (D.C. Cir. 1980).

[14] 463 F.2d 1261 (D.C. Cir. 1972).

and that Canadian interests were not adequately represented by other parties in the case.

In sum, based on legal and policy considerations, CEQ has determined that agencies must include analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis of proposed actions in the United States.

PRACTICAL CONSIDERATIONS

CEQ notes that many proposed federal actions will not have transboundary effects, and cautions agencies against creating boilerplate sections in NEPA analyses to address this issue. Rather, federal agencies should use the scoping process[15] to identify those actions that may have transboundary environmental effects and determine at that point their information needs, if any, for such analyses. Agencies should be particularly alert to actions that may affect migratory species, air quality, watersheds, and other components of the natural ecosystem that cross borders, as well as to interrelated social and economic effects.[16] Should such potential impacts be identified, agencies may rely on available professional sources of information and should contact agencies in the affected country with relevant expertise.

Agencies have expressed concern about the availability of information that would be adequate to comply with NEPA standards that have been developed through the CEQ regulations and through judicial decisions. Agencies do have a responsibility to undertake a reasonable search for relevant, current information associated with an identified potential effect. However, the courts have adopted a "rule of reason" to judge an agency's actions in this respect, and do not require agencies to discuss "remote and highly speculative consequences".[17] Furthermore,

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[15] 40 CFR 1501.7. Scoping is a process for determining the scope of the issues to be addressed and the parties that need to be involved in that process prior to writing the environmental analyses.

[16] It is a well accepted rule that under NEPA, social and economic impacts by themselves do not require preparation of an EIS. 40 CFR 1508.14.

[17] Trout Unlimited v. Morton, 509 F.2d 1276, 1283 (9th Cir. 1974). See also, Northern Alaska Environmental Center v. Lujan, 961 F.2d 886, 890 (9th Cir. 1992); Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir. 1992); San Luis Obispo Mothers for Peace v. N.R.C., 751 F.2d 1287, 1300 (D.C. Cir. 1984); Scientists Institute for Public Information, Inc. v. Atomic Energy Commission, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

CEQ's regulation at 40 CFR 1502.22 dealing with incomplete or unavailable information sets forth clear steps to evaluating effects in the context of an EIS when information is unobtainable.[18] Additionally, in the context of international agreements, the parties may set forth a specific process for obtaining information from the affected country which could then be relied upon in most circumstances to satisfy agencies' responsibility to undertake a reasonable search for information.

Agencies have also pointed out that certain federal actions that may cause transboundary effects do not, under U.S. law, require compliance with Sections 102(2)(C) and 102(2)(E) of NEPA. Such actions include actions that are statutorily exempted from NEPA, Presidential actions, and individual actions for which procedural compliance with NEPA is excused or modified by virtue of the CEQ regulations[19] and various judicial doctrines interpreting NEPA[20]. Nothing in this guidance changes the agencies' ability to rely on those rules and doctrines.

INTERNATIONAL LAW

It has been customary law since the 1905 Trail Smelter Arbitration that no nation may undertake acts on its territory that will harm the territory of another state[21]. This rule of

[18] See Preamble to Amendment of 40 CFR 1502.22, deleting prior requirement for "worst case analysis" at 51 Federal Register 15625, April 25, 1986, for a detailed explanation of this regulation.

[19] For example, agencies may contact CEQ for approval of alternative arrangements for compliance with NEPA in the case of emergencies. 40 CFR 1506.11.

[20] For example, courts have recognized that NEPA does not require an agency to make public information that is otherwise properly classified information for national security reasons, Weinberger v. Catholic Action of Hawaii, 454 U.S. 139 (1981).

[21] *Trail Smelter Arbitration*, U.S. v. Canada, 3 UN Rep. Int'l Arbit. Awards 1911 (1941). The case involved a smelter in British Columbia that was causing environmental harm in the state of Washington. The decision held that "under principles of International Law, as well as the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is described by clear and convincing injury." *Id.* at 1965). Also see the American Law Institute's Restatement of the Foreign Relations Law of the United States 3d, Section 601, ("State obligations with respect to environment of other States and the common environment").

customary law has been recognized as binding in Principle 21 of the Stockholm Declaration on the Human Environment and Principle 2 of the 1992 Rio Declaration on Environment and Development. This concept, along with the duty to give notice to others to avoid or avert such harm, is incorporated into numerous treaty obligations undertaken by the United States. Analysis of transboundary impacts of federal agency actions that occur in the United States is an appropriate step towards implementing those principles.

CONCLUSION

NEPA requires agencies to include analysis of reasonably foreseeable transboundary effects of proposed actions in their analysis of proposed actions in the United States. Such effects are best identified during the scoping stage, and should be analyzed to the best of the agency's ability using reasonably available information. Such analysis should be included in the EA or EIS prepared for the proposed action.

ATTACHMENT C

Dams and Reservoirs Along the Lower Colorado River

This attachment describes the dams and reservoirs on the mainstem of the Colorado River from Glen Canyon Dam in Arizona to Morelos Dam along the international boundary with Mexico. The role that each plays in the operation of the Colorado River system is also explained.

COLORADO RIVER DAMS AND RESERVOIRS
Lake Powell to the Southerly International Boundary

The following discussion summarizes the dams and reservoirs along the Colorado River from Lake Powell to the Southerly International Boundary (SIB) with Mexico and their specific roles in the operation of the Colorado River. Individual dams serve one or more specific purposes as designated in their federal construction authorizations. Such purposes are, water storage, flood control, river regulation, power generation, and water diversion to Arizona, California, Nevada and delivery to Mexico. The All-American Canal is included in this summary because it conveys some of the water delivered to Mexico and thereby contributes to the river system operation. The dams and reservoirs are listed in the order of their location along the river proceeding downstream from Lake Powell.

Glen Canyon Dam – Glen Canyon Dam, which formed Lake Powell, is a principal part of the Colorado River Storage Project. It is a concrete arch dam 710 feet high and 1,560 feet wide. The maximum generating discharge capacity is 33,200 cfs which may be augmented by an additional 15,000 cfs through the river outlet works. The active capacity of Lake Powell is 24,300,000 af. Lake Powell has no legislated flood control space. The required system flood control space is allocated among selected project reservoirs including Lake Powell, to augment the 1.5 maf required to be available in Lake Mead.

Hoover Dam – Hoover Dam was constructed in the Black Canyon of the Colorado River about 36 miles from Las Vegas, Nevada. Hoover Dam was constructed to provide storage for river regulation and flood control, storage of water for irrigation and domestic uses and generation of hydropower. Recreation also constitutes a major use of Lake Mead. The dam is 726 feet high and the water depth is approximately 590 feet. Lake Mead can store water to a maximum elevation of 1,221.4 feet above msl (maximum water surface). Hoover Dam spillway gates in the raised position would equal elevation 1229 feet. At that elevation Lake Mead has a nominal "live capacity" of 27,377,000 af and an active capacity of 17,353,000 af above elevation 1083 feet msl, the minimum elevation for power generation. However, sediment accumulation in the upper end of the reservoir is gradually decreasing the water storage capacity. The dam backs water upstream approximately 115 miles creating a surface area of about 163,000 acres at its maximum design water surface elevation of 1229 feet msl. Flood storage of 1.5 maf is located between elevation 1,219.6 and 1,229 msl.

Hoover Powerplant is a major source of hydropower in the Southwest. The powerplant generating capacity is rated at approximately 2,062,000 Kw with maximum release capacity of approximately 49,000 cfs. The spillways have a maximum release capacity of about 400,000 cfs at 1,232 msl with the drum gates in a closed position. This provides a total release capacity of 449,000 cfs.

Davis Dam – Davis Dam and Powerplant are 67 miles downstream from Hoover Dam, and approximately 2 miles upstream from Laughlin, Nevada, and Bullhead City, Arizona. The dam's primary purpose is to re-regulate Hoover Dam releases and aid in delivery of Mexico's annual apportionment of 1.5 maf, and meet downstream demand. Located on the Arizona side of the river, the Davis Dam Powerplant has five generating units, each rated at 50,000

Kw, whose combined hydraulic capacity is 31,000 cfs.

Lake Mohave lies behind Davis Dam and is bounded for most of its 67-mile length by the steep walls of Pyramid, Eldorado, and Black Canyons. The lake is relatively narrow, not more than 4 miles across at its widest point, but provides significant recreation opportunities and habitat for fish and wildlife. The lake also captures and delays flash flood discharge from the side washes below Hoover Dam. Typical flow time from Hoover Dam to Lake Mohave is 4 to 6 hours. The lake has a storage capacity of 1,818,000 af.

Parker Dam – Parker Dam spans the Colorado River between Arizona and California 17 miles northeast of the town of Parker, Arizona. Parker Dam's primary purpose is to provide reservoir storage from which water can be pumped into the Colorado River aqueduct and the CAP aqueduct. Lake Havasu, the reservoir behind Parker Dam, is about 45 miles long and covers 20,390 acres. It can store 648,000 af of water. Typical flow time from Davis Dam to Lake Havasu is 1 to 1.5 days.

Parker Powerplant is located on the California side of the Colorado River immediately below the dam. It houses four hydroelectric generating units, each of which can produce 30,000 Kw of hydroelectric power. Four 22-foot diameter penstocks carry up to 5,500 cfs each, to feed the generating units. Fifty percent of the plant's power output is reserved for MWD's use to pump water along the Colorado River aqueduct to the Pacific Coast. The remaining power is marketed by WAPA, a DOE agency. Under an agreement between Reclamation and MWD, the latter agency financed essentially the entire cost of constructing Parker Dam. MWD's Whitsett Pumping Plant, 2 miles upstream from the dam on Lake Havasu, lifts water from the reservoir into the Colorado River Aqueduct.

Headgate Rock Dam – Headgate Rock Dam is located on the river about 14 miles below Parker Dam about a mile northeast of the town of Parker. It was constructed as a diversion structure to provide irrigation water to the Colorado River Indian Reservation. A 3-unit, low-head powerplant is built into the dam structure. The water retained by the dam is named Lake Moovalya, which extends upstream approximately 10 miles and contributes a stable water surface to the recreational area referred to as the Parker strip. The dam raises the river water level approximately 15 feet but develops no useable storage. The water releases below Headgate Rock Dam mirror the releases from Parker Dam. The maximum powerplant discharge is 20,000 cfs. The maximum generating capacity of the powerplant is 19.5 MW. Typical flow time from Parker Dam to Headgate Rock Dam is 1 to 4 hours.

Palo Verde Diversion Dam – The Palo Verde Diversion Dam consists of a concrete, gated structure with an adjacent embankment, constructed as a permanent replacement for the old Palo Verde rock weir. The dam raises the water levels approximately 12 feet, which is sufficient for the gravity flow to provide the water supply to the Palo Verde Valley including the city of Blythe. The impoundment has no useable storage even though the backwater from the dam reflects approximately 15 miles upstream. The dam is operated and maintained by the PVID. Typical flow time from Headgate Rock Dam to Palo Verde Diversion Dam is about 1 day.

Senator Wash Pumping/Generating Plant and Regulating Reservoir – The Senator Wash

facility is a pumped offstream storage facility located approximately 2 miles upstream from Imperial Dam. It was constructed to supplement limited storage behind Imperial Dam and Laguna Dam responding to sudden changes in water delivery requirements at Imperial Dam; the water travel time from Davis Dam to Imperial Dam is 3 days or more. When sufficient storage is not available at Imperial and Laguna Dams, Senator Wash is used to regulate excess flows arriving at Imperial Dam to prevent over deliveries to Mexico, and to ensure demands can be met when flows arriving at Imperial Dam are less than water user demand. The reservoir elevation fluctuates according to water user demand and flows arriving at Imperial Dam.

The reservoir has a capacity of 13,836 af at elevation 251 feet msl. However, current reservoir restrictions prevent raising the reservoir to elevation 251 feet due to concerns with seepage and high hydraulic pressure under the toe of Senator Wash Dam and along Squaw Lake Dike.

Imperial Dam – Imperial Dam, approximately 18 miles northeast of Yuma, Arizona, was constructed to provide a diversion of Colorado River water to the Imperial and Coachella Valleys, to the Reservation Division and the City of Yuma through the first reach of the All-American Canal on the west side of the dam; and to the Gila Project and the Yuma Auxiliary Project through the Gila Gravity Main Canal on the east side of the dam. Imperial Dam, which raised the water surface above the original river 23 feet to elevation 181 feet msl, was designed to provide a maximum diversion of 15,155 cfs for the All-American Canal; 2,200 cfs for the Gila Gravity Main Canal; and was designed to pass a maximum flood of 180,000 cfs. Typical flow time from Palo Verde Diversion Dam to Imperial Dam is about 2 days.

Imperial Dam created a reservoir that originally had a capacity of 85,000 af but, as was anticipated, the reservoir quickly filled with sediment. Intermittent dredging and sluicing operations are required to maintain a small reservoir pool of about 1,000 af in capacity to ensure diversions can be made to the All-American Canal and Gila Gravity Main Canal. Desilting works were provided for both the All-American Canal and Gila Gravity Main Canal. Sediment accumulations are sluiced downstream to the Laguna Desilting Basin where the sediment is removed by dredging and disposed of adjacent to the desilting basin.

All-American Canal, Pilot Knob and Siphon Drop Powerplants – The All-American Canal is approximately 80 miles long and provides irrigation water to over 500,000 acres of land in the Imperial Valley, over 78,000 acres in the Coachella Valley, approximately 15,000 acres in the Reservation Division of the Yuma Project, and over 40,000 acres in the Valley Division of the Yuma Project. Situated along the All-American Canal are two turnouts through which water is released for use in Mexico and in the Reservation Division, after passing through a powerplant at each turnout.

A wasteway was constructed on the All-American Canal at Pilot Knob, to which a power generation facility was added. Both facilities are located upstream of Morelos Dam. The wasteway was constructed to protect the All-American Canal and provide a place to discharge excess water back to the Colorado River, in particular those deriving from side wash inflows or sudden water user cutbacks in Imperial Valley. Pilot Knob Powerplant was constructed to allow generation of power from water deliveries made in satisfaction of the 1944 Treaty with

Mexico. Pilot Knob has 55 feet of hydraulic head and can produce up to 33,000 Kw of electricity.

Siphon Drop Powerplant operates to develop power from Yuma Project deliveries and deliveries made to Mexico. Currently, if Mexico's order at the NIB, less drainage return flows and sediment control flows below Imperial Dam, is greater than 800 cfs, the water is routed through the Pilot Knob Powerplant to generate power, which then takes away water that would otherwise have been delivered either below Laguna Dam or through Siphon Drop Powerplant and the California wasteway near Yuma, Arizona.

If Mexico's order at the NIB, less drainage return flows and sediment control flows below Imperial Dam, is less than 800 cfs, the water is normally routed through the Siphon Drop Powerplant to generate power. Siphon Drop Powerplant requires a minimum flow of 350 cfs to operate and, to the extent possible, this flow is maintained through delivery requirements to Mexico and water ordered for the Valley Division of the Yuma Project.

The Yuma Main Canal wasteway, more commonly referred to as the California wasteway, was constructed to protect the Yuma Main Canal if excess flows are diverted into the canal or sudden cutbacks in water use in the Yuma Valley occur. The wasteway allows those excess flows to be diverted back into the Colorado River. Now a portion of the water delivery to Mexico is routed down the All-American Canal through Siphon Drop Powerplant and the Yuma Main Canal wasteway.

Laguna Dam – Laguna Dam was originally constructed (1905 - 1909) to serve as a diversion structure and desilting works for the Yuma Main Canal on the California side of the Colorado River and for the North Gila Canal on the Arizona side of the Colorado River. The dam raised the water level above the original stream bed approximately 13 feet. However, now these canals receive their water from the All-American Canal, diverted at Imperial Dam. And Laguna Dam serves as a regulating structure for sluicing flows that control sediment below Laguna Dam, and to help store excess flows that arrive at Imperial Dam to prevent over deliveries to Mexico. Water stored behind Laguna Dam can be used to make up part of Mexico's water order when a shortage of water relative to water user demand arrives at Imperial Dam. Laguna Dam also protects the downstream toe of Imperial Dam. Typical flow time from Imperial Dam to Laguna Dam is about 2 hours.

Total storage behind Laguna Dam is currently estimated to be 700 af. Prior to the 1983 Colorado River flood the capacity was approximately 1,500 af. Dredging was carried out behind Laguna Dam in the 1950s to the early 1970s, in order to maintain its relatively small storage capacity. Sediment removed from above Laguna Dam was placed directly downstream of the rockfill weir in the flood plain.

Morelos Dam – Morelos Dam is located along the limitrophe section of the Colorado River, approximately 9 miles southwest of Yuma, Arizona. Morelos Dam was constructed by Mexico to provide a diversion for the delivery of Colorado River water to the Mexicali Valley. Mexico is responsible for the operation and maintenance of Morelos Dam and associated expenses.

Under Minute 242 (Minutes are defined as decisions of IBWC and signed by the Mexican and United States commissioners of IBWC) of the Mexican Water Treaty of 1944, up to 140,000 af annually of agricultural drainage water can be delivered to Mexico at the SIB. The remaining 1,360,000 af of water is to be delivered to Mexico at the NIB annually and diverted at Morelos Dam to the Mexicali Valley of Mexico

Flows below Morelos Dam occur only when water in excess of Mexico's diversion requirements arrives at the dam, in which case the excess is normally passed through Morelos Dam into the original Colorado River Channel downstream. Water in excess of Mexico's water order occurs when surplus or flood releases are made from either the Colorado River system or the Gila River system. Excess water arriving at Mexico may also result from side wash inflows that occur above or below Imperial Dam; from a sudden drop in water user demand; or when insufficient storage is available in Senator Wash, Imperial or Laguna reservoirs.

Flows arriving at Morelos Dam normally range from about 900 cfs to over 3,000 cfs during the year. During 1983, flows in excess of 40,000 cfs arrived at the NIB due to flood control releases on the Colorado River, and in 1993 flows in excess of 25,000 cfs arrived at the NIB due to flooding on the Gila River. Typical flow time from Laguna Dam to Morelos Dam is about 6 hours.

ATTACHMENT D

Glen Canyon Dam Operation Record of Decision

This attachment is the October 8, 1996 Record of Decision prepared for the Operation of Glen Canyon Dam Final Environmental Impact Statement, March 1995.

RECORD OF DECISION

OPERATION OF GLEN CANYON DAM

Final Environmental Impact Statement

October 1996

Approved

Date OCT 08 1996

Commissioner, U.S. Bureau of Reclamation

Date OCT 09 1996

Secretary of the Interior

RECORD OF DECISION

OPERATION OF GLEN CANYON DAM
FINAL ENVIRONMENTAL IMPACT STATEMENT

I. INTRODUCTION

This record of decision (ROD) of the Department of the Interior, Bureau of Reclamation (Reclamation), documents the selection of operating criteria for Glen Canyon Dam, as analyzed in the final Environmental Impact Statement (EIS), dated March 21, 1995 (FES 95-8). The EIS on the operation of Glen Canyon Dam was prepared with an unprecedented amount of scientific research, public involvement, and stakeholder cooperation.

Scientific evidence gathered during Phase I of the Glen Canyon Environmental Studies (GCES) indicated that significant impacts on downstream resources were occurring due to the operation of Glen Canyon Dam. These findings led to a July 1989 decision by the Secretary of the Interior for Reclamation to prepare an EIS to reevaluate dam operations. The purpose of the reevaluation was to determine specific options that could be implemented to minimize, consistent with law, adverse impacts on the downstream environment and cultural resources, as well as Native American interests in Glen and Grand Canyons. Analysis of an array of reasonable alternatives was needed to allow the Secretary to balance competing interests and to meet statutory responsibilities for protecting downstream resources and producing hydropower, and to protect affected Native American interests.

In addition, the Grand Canyon Protection Act of 1992 was enacted on October 30, 1992. Section 1802 (a) of the Act requires the Secretary to operate Glen Canyon Dam:

> "...in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use."

Alternatives considered include the No Action Alternative as well as eight operational alternatives that provide various degrees of protection for downstream resources and hydropower production.

II. DECISION

The Secretary's decision is to implement the Modified Low Fluctuating Flow Alternative (the preferred alternative) as described in the final EIS on the Operation of Glen Canyon Dam with a minor change in the timing of beach/habitat building flows (described below). This alternative was selected because it will reduce daily flow fluctuations well below the no action levels (historic pattern of releases) and will provide high steady releases of short duration which will protect or enhance downstream resources while allowing limited flexibility for power operations.

The Modified Low Fluctuating Flow Alternative incorporates beach/habitat-building flows which are scheduled high releases of short duration designed to rebuild high elevation sandbars, deposit nutrients, restore backwater channels, and provide some of the dynamics of a natural system. In the final EIS, it was assumed that these flows would occur in the spring when the reservoir is low, with a frequency of 1 in 5 years.

The Basin States expressed concern over the beach/habitat-building flows described in the final EIS because of the timing of power plant by-passes. We have accomodated their concerns, while maintaining the objectives of the beach/habitat-building flows. Instead of conducting these flows in years in which Lake Powell storage is low on January 1, they will be accomplished by utilizing reservoir releases in excess of power plant capacity required for dam safety purposes. Such releases are consistent with the 1956 Colorado River Storage Project Act, the 1968 Colorado River Basin Project Act, and the 1992 Grand Canyon Protection Act.

Both the Colorado River Management Work Group and the Transition Work Group, which participated in the development of the Annual Operating Plan and the EIS, respectively, support this change as it conforms unambiguously with each member's understanding of the Law of the River. These groups include representatives of virtually all stakeholders in this process.

The upramp rate and maximum flow criteria were also modified between the draft and final EIS. The upramp rate was increased from 2,500 cubic feet per second per hour to 4,000 cubic feet per second per hour, and the maximum allowable release was increased from 20,000 to 25,000 cubic feet per second. We made these modifications to enhance power production flexibility, as suggested by comments received. These modifications were controversial among certain interest groups because of concerns regarding potential impacts on resources in the Colorado River and the Grand Canyon. However, our analysis indicates that there would be no significant differences in impacts associated with these changes ("Assessment of Changes to the Glen Canyon Dam EIS Preferred Alternative from Draft to Final EIS", October 1995).

The 4,000 cubic feet per second per hour upramp rate limit will be implemented with the understanding that results from the monitoring program will be carefully considered. If impacts differing from those described in the final EIS are identified, a new ramp rate criterion will be considered by the Adaptive Management Work Group and a recommendation for action forwarded to the Secretary.

The maximum flow criterion of 25,000 cubic feet per second will be implemented with the understanding that actual maximum daily releases would only occasionally exceed 20,000 cubic feet per second during a minimum release year of 8.23 million acre-feet. This is because the maximum allowable daily change constraint overrides the maximum allowable release and because monthly release volumes are lower during minimum release years. If impacts differing from those described in the final EIS are identified through the Adaptive Management Program, the maximum flow restriction will be reviewed by the Adaptive Management Work Group and a recommendation for action will be forwarded to the Secretary.

III. DESCRIPTION OF ALTERNATIVES

Nine alternative methods of operating Glen Canyon Dam (including the No Action Alternative) were presented in the final EIS. The eight action alternatives were designed to provide a reasonable range of alternatives with respect to operation of the dam. One alternative would allow unrestricted fluctuations in flow (within the physical constraints of the power plant) to maximize power production, four would impose varying restrictions on fluctuations, and three others would provide steady flows on a monthly, seasonal, or annual basis. The names of the alternatives reflect the various operational regimes. In addition, the restricted fluctuating flow and steady flow alternatives each include seven elements which are common to all of them. These common elements are: 1) Adaptive Management, 2) Monitoring and Protecting Cultural Resources, 3) Flood Frequency Reduction Measures, 4) Beach/Habitat-Building Flows, 5) New Population of Humpback Chub, 6) Further Study of Selective Withdrawal, and 7) Emergency Exception Criteria. A detailed description of the alternatives and common elements can be found in Chapter 2 of the final EIS. A brief description of the alternatives is given below.

UNRESTRICTED FLUCTUATING FLOWS

No Action: Maintain the historic pattern of fluctuating releases up to 31,500 cubic feet per second and provide a baseline for impact comparison.

Maximum Power plant Capacity: Permit use of full power plant capacity up to 33,200 cubic feet per second.

RESTRICTED FLUCTUATING FLOWS

High: Slightly reduce daily fluctuations from historic levels.

Moderate: Moderately reduce daily fluctuations from historic levels; includes habitat maintenance flows.

Modified Low (Preferred Alternative): Substantially reduce daily fluctuations from historic levels; includes habitat maintenance flows.

Interim Low: Substantially reduce daily fluctuations from historic levels; same as interim operations except for addition of common elements.

STEADY FLOWS

Existing Monthly Volume: Provide steady flows that use historic monthly release strategies.

Seasonally Adjusted: Provide steady flows on a seasonal or monthly basis; includes habitat maintenance flows.

Year-Round: Provide steady flows throughout the year.

Table 1 shows the specific operational criteria for each of the alternatives.

IV. SIGNIFICANT ISSUES AND ALTERNATIVES

The Glen Canyon Dam EIS scoping process was initiated in early 1990 and the public was invited to comment on the appropriate scope of the EIS. More than 17,000 comments were received during the scoping period, reflecting the national attention and intense interest in the EIS.

As a result of the analysis of the oral and written scoping comments, the following were determined to be resources or issues of public concern: beaches, endangered species, ecosystem integrity, fish, power costs, power production, sediment, water conservation, rafting/boating, air quality, the Grand Canyon wilderness, and a category designated as "other" for remaining concerns. Comments regarding interests and values were categorized as: expressions about the Grand Canyon, economics, nonquantifiable values, nature versus human use, and the complexity of Glen Canyon Dam issues.

The EIS team consolidated and refined the public issues of concern, identifying the significant resources and associated issues to be analyzed in detail. These resources include: water, sediment, fish, vegetation, wildlife and habitat, endangered and other special status species, cultural resources, air quality, recreation, hydropower, and non-use value.

Further meetings were held with representatives from the cooperating agencies and public interest groups who provided comments on the criteria for development of reasonable alternatives for the EIS. The public also had an opportunity to comment on the preliminary selection of alternatives at public meetings and through mailings. The final selection of alternatives took into consideration the public's views.

V. COMMENTS RECEIVED ON THE FINAL EIS

Many comments and recommendations on the final EIS were received in the form of pre-printed postcards and letters that addressed essentially the same issues. The comments are summarized below along with Reclamation's responses.

COMMENT: Maintain Draft EIS flows. Modifying the upramp rate and maximum flows

Table 1.—Operating limits of alternatives identified for detailed analysis

	Unrestricted Fluctuating Flows		Restricted Fluctuating Flows				Steady Flows		
	No Action	Maximum Powerplant Capacity	High	Moderate	Modified Low	Interim Low	Existing Monthly Volume	Seasonally Adjusted	Year-Round
Minimum releases (cfs)[1]	1,000 Labor Day–Easter [2]3,000 Easter–Labor Day	1,000 Labor Day–Easter [2]3,000 Easter–Labor Day	3,000 5,000 8,000 depending on monthly volume, firm load, and market conditions	5,000	8,000 between 7 a.m. and 7 p.m. 5,000 at night	8,000 between 7 a.m. and 7 p.m. 5,000 at night	8,000	[3]8,000 Oct–Nov 8,500 Dec 11,000 Jan–Mar 12,500 Apr 18,000 May–Jun 12,500 Jul 9,000 Aug–Sep	Yearly volume prorated[4]
Maximum releases (cfs)[5]	31,500	33,200	31,500	31,500 (may be exceeded during habitat maintenance flows)	25,000 (may be exceeded during habitat maintenance flows)	20,000	Monthly volumes prorated	18,000 (exceeded during habitat maintenance flows)	Yearly volume prorated[4]
Allowable daily flow fluctuations (cfs/24 hours)	30,500 Labor Day–Easter 28,500 Easter–Labor Day	32,200 Labor Day–Easter 30,200 Easter–Labor Day	18,000 to 22,000	±45% of mean flow for the month not to exceed ±6,000	[6]8,000 8,000 or 6,000	[6]5,000 6,000 or 8,000	[7]±1,000	[7]±1,000	[7]±1,000
Ramp rates (cfs/hour)	Unrestricted	Unrestricted	Unrestricted up 5,000 or 4,000 down	4,000 up 2,500 down	4,000 up 1,500 down	2,500 up 1,500 down	2,000 cfs/day between months	2,000 cfs/day between months	2,000 cfs/day between months
Common elements	None	None	Adaptive management (including long-term monitoring and research) Monitoring and protecting cultural resources Flood frequency reduction measures Beach/habitat-building flows New population of humpback chub Further study of selective withdrawal Emergency exception criteria						

[1] In high volume release months, the allowable daily change would require higher minimum flows (cfs).
[2] Releases each weekday during recreation season (Easter to Labor Day) would average not less than 8,000 cfs for the period from 8 a.m. to midnight.
[3] Based on an 8.23-million-acre-foot (maf) year; in higher release years, additional water would be added equally to each month, subject to an 18,000-cfs maximum.
[4] For an 8.23-maf year, steady flow would be about 11,400 cfs.
[5] Maximums represent normal or routine limits and may necessarily be exceeded during high water years.
[6] Daily fluctuation limit of 5,000 cfs for monthly release volumes less than 600,000 acre-feet; 8,000 cfs for monthly release volumes of 600,000 to 800,000 acre-feet; and 8,000 cfs for monthly volumes over 800,000 acre-feet.
[7] Adjustments would allow for small power system load changes.

between the draft and final EIS has neither been open for public review nor subjected to serious scientific scrutiny. These changes should have been addressed in the draft EIS and made available for public comment at that time. Credible proof, based on the testing of a specific scientific hypothesis, that alterations in operating procedures at Glen Canyon Dam follow the spirit and intent of the Grand Canyon Protection Act needs to be provided. The burden of proof that there will be no impact on downstream resources rests with those proposing changes.

RESPONSE: The modification of the preferred alternative, which incorporated changes in the upramp rate and maximum flows, was made after extensive public discussion. The new preferred alternative was discussed as an agenda item during the May, June, August, and November 1994 public meetings of the Cooperating Agencies who assisted in the development of the EIS. A wide range of public interest groups received advance mailings and agendas and were represented at the public meetings. The environmental groups attending these meetings included: America Outdoors, American Rivers, Desert Flycasters, Environmental Defense Fund, Friends of the River, Grand Canyon River Guides, Grand Canyon Trust, Sierra Club, and Trout Unlimited. Meeting logs indicate that representatives from at least some of these groups attended all but the May meeting. In addition, approximately 16,000 citizens received periodic newsletters throughout the EIS process. This included a newsletter outlining the proposed changes issued several months prior to the final EIS. The environmental groups mentioned above were included on the newsletter mailing list.

Reclamation's research and analysis has been thorough with regards to changes in flows and ramping rates and potential impacts upon downstream resources. A complete range of research flows was conducted from June 1990 to July 1991. These included high and low fluctuating flows with fast and slow up and down ramp rates. Glen Canyon Environmental Studies Phase II identified cause and effect relationships between downramp rates and adverse impacts to canyon resources. However, no cause and effect relationships between upramp rates and adverse impacts to canyon resources were identified. The draft EIS; (a public document peer reviewed by GCES and the EIS Cooperating Agencies) states that upramp rates have not been linked to sandbar erosion (page 95) and that "Rapid increases in river stage would have little or no effect on sandbars." (page 190).

With respect to potential impacts occurring with the change in flows, it should be noted that sand in the Grand Canyon is transported almost exclusively by river flows. The amount of sand transported increases exponentially with increases in river flow. Maintaining sandbars over the long term depends on the amount of sand supplied by tributaries, monthly release volumes, range of flow fluctuations, and the frequency and distribution of flood flows. Conversely, occasional flows between 20,000 and 25,000 cubic feet per second may cause minor beach building, and may provide water to riparian vegetation.

As part of the EIS, the effects of each alternative on long-term sand storage in Marble Canyon (river miles 0 to 61) were analyzed. The Marble Canyon reach was chosen for analysis because it is more sensitive to impacts from dam operations than downstream reaches. For each fluctuating flow alternative, the analysis used 20 years of hourly flow modeled by Spreck Rosekrans of the Environmental Defense Fund and 85 different hydrologic scenarios (each representing 50 years of

monthly flow data). This analysis was documented in the draft EIS on page 182, and Appendix D, pages 4-5. The analyses relating to the probability of net gain in riverbed sand for each alternative is documented in the draft EIS on pages 54-55, 184, 187, and 194.

Specific peer reviewed studies relating to the above analyses are listed in Attachment 1.

COMMENT: Do not change the upramp rate and maximum flow criteria at the same time. While acknowledging Reclamation's good efforts to identify and establish optimum operating criteria for all users of Glen Canyon Dam, changing two flow criteria (upramp rate and maximum flow criterion of preferred alternative) does not make prudent scientific sense. It will not result in reliable data. Not enough information is at hand to predict the outcome of these proposals.

RESPONSE: Viewed from the purely scientific viewpoint, it would be preferable to change variables one at a time in a controlled experiment. However, many uncontrolled variables already exist, and from a resource management standpoint the interest lies in measuring the possible resource impact, if any, which might result from jointly changing both criteria. The best available information suggests that the long-term impact of changing both criteria at once will be difficult, if not impossible to detect.

Even though both parameters would change, for 8 months of an 8.23 million acre foot year (minimum release year), only the upramp rate will be used. The ability to operationally exceed 20,000 cubic feet per second only exists in months in which releases are in excess of 900,000 acre feet. In a minimum release year, flows above 20,000 cubic feet per second will most likely occur in December, January, July, and August. Evaluation of the upramp rates can be initiated immediately with the evaluation of the increase in maximum flow relegated to the months with the highest volumes. New upramp and maximum flow criteria would be recommended through the Adaptive Management Program should monitoring results indicate that either of these criteria are resulting in adverse impacts to the natural, cultural, or recreational (human safety) resources of the Grand Canyon differing from those shown in the final EIS.

COMMENT: "Habitat/Beach Building Floods" designed to redeposit sediment and reshape the river's topography much like the Canyon's historic floods should be conducted. An experimental release based on this premise is critical to restore some of the river's historic dynamics; without it, any flow regime will result in continued loss of beach and backwater habitat. This "spike" should be assessed and implemented for the spring of 1996, subject to a critical evaluation of its flow size, timing, impact on fisheries, and completion of a comprehensive monitoring plan. Recent side-canyon floods underscore the need for restoring natural processes.

RESPONSE: Reclamation and the Cooperating Agencies continue to support this concept. The preferred alternative supports such a flow regime. A test flow was conducted this spring. The results of this flow are currently being analyzed. We expect to conduct more of these flows in the future.

COMMENT: Endorse the Fish & Wildlife Service's Biological Opinion and implement

experimental steady flows to benefit native fishes, subject to the results of a risk/benefit analysis now in progress.

RESPONSE: The preferred alternative provides for experimental steady flows through the Adaptive Management Program for the reasons put forth in the Biological Opinion.

COMMENT: Fund and implement immediately an Adaptive Management Program. This is the appropriate forum to address important issues. It is imperative that resource management rely on good science to monitor, and respond to possible adverse effects resulting from changes in dam operations.

RESPONSE: The preferred alternative provides for implementation of an Adaptive Management Program.

COMMENT: Interior Secretary Babbitt should issue a Record of Decision by December 31, 1995, and conduct an efficient and timely audit by the General Accounting Office as mandated by the Grand Canyon Protection Act.

RESPONSE: In compliance with the Grand Canyon Protection Act, Interior Secretary Babbitt could not issue the Record of Decision until considering the findings of the General Accounting Office. Those findings were issued on October 2, 1996.

OTHER COMMENTS: Another set of comments were received from municipalities and other power user groups. These letters made up about 3 percent of the total received and were essentially identical in content. Although the authors were not totally in agreement with the preferred alternative because of the reduction in peaking power, they believe it is a workable compromise. These letters characterized the final EIS as ". . .a model for resolving complex environmental issues among divergent interests." They also urged the government to protect the integrity of the process, resist efforts to overturn the FEIS, and allow the scientists' assessment to stand, in as much as the Adaptive Management Process will give Reclamation an opportunity to evaluate the effects of operational changes over time and make modifications according to scientific findings.

RESPONSE: While the preferred alternative may not satisfy all interests, Reclamation believes it is a workable compromise and meets the two criteria set out in the EIS for the reoperation of the dam, namely restoring downstream resources and maintaining hydropower capability and flexibility.

A letter of comment from the Environmental Protection Agency (EPA) indicates that EPA's comments on the draft EIS were adequately addressed in the final EIS. It also expresses their support for the preferred alternative.

Samples of the comment letters and cards, and a copy of EPA's comment letter are included as Attachment 2.

VI. ENVIRONMENTAL COMMITMENTS AND MONITORING

The following environmental and monitoring commitments will be carried out under the preferred alternative or any of the other restricted fluctuating or steady flow alternatives described in the final EIS. A detailed description of these commitments can be found on pages 33 - 43 of that document. All practicable means to avoid or minimize environmental harm from the preferred alternative have been adopted.

1. **Adaptive Management:** This commitment includes the establishment of an Adaptive Management Workgroup, chartered in accordance with the Federal Advisory Committee Act; and development of a long-term monitoring, research, and experimental program which could result in some additional operational changes. However, any operational changes will be carried out in compliance with NEPA.

2. **Monitoring and Protection of Cultural Resources:** Cultural sites in Glen and Grand Canyons include prehistoric and historic sites and Native American traditional use and sacred sites. Some of these sites may erode in the future under any EIS alternative, including the no action alternative. Reclamation and the National Park Service, in consultation with Native American Tribes, will develop and implement a long-term monitoring program for these sites. Any necessary mitigation will be carried out according to a programmatic agreement written in compliance with the National Historic Preservation Act. This agreement is included as Attachment 5 in the final EIS.

3. **Flood Frequency Reduction Measures:** Under this commitment, the frequency of unanticipated floods in excess of 45,000 cubic feet per second will be reduced to an average of once in 100 years. This will be accomplished initially through the Annual Operating Plan process and eventually by raising the height of the spillway gates at Glen Canyon Dam 4.5 feet.

4. **Beach/Habitat-Building Flows:** Under certain conditions, steady flows in excess of a given alternative's maximum will be scheduled in the spring for periods ranging from 1 to 2 weeks. Scheduling, duration, and flow magnitude will be recommended by the Adaptive Management Work Group and scheduled through the Annual Operating Plan process. The objectives of these flows are to deposit sediment at high elevations, re-form backwater channels, deposit nutrients, restore some of the natural system dynamics along the river corridor, and help the National Park Service manage riparian habitats.

5. **New Population of Humpback Chub:** In consultation with the U.S. Fish and Wildlife Service (FWS), National Park Service, and Arizona Game and Fish Department (AGFD), Reclamation will make every effort (through funding, facilitating, and technical support) to ensure that a new population of humpback chub is established in the mainstem or one or more of the tributaries within Grand Canyon.

6. **Further Study of Selective Withdrawal:** Reclamation will aggressively pursue and support research on the effects of multilevel intake structures at Glen Canyon Dam and use the results of this research to decide whether or not to pursue construction. FWS, in consultation with AGFD,

will be responsible for recommending to Reclamation whether or not selective withdrawal should be implemented at Glen Canyon Dam. Reclamation will be responsible for design, NEPA compliance, permits, construction, operation, and maintenance.

7. **Emergency Exception Criteria:** Operating criteria have been established to allow the Western Area Power Administration to respond to various emergency situations in accordance with their obligations to the North American Electric Reliability Council. This commitment also provides for exceptions to a given alternative's operating criteria during search and rescue situations, special studies and monitoring, dam and power plant maintenance, and spinning reserves.

VII. BASIS FOR DECISION

The goal of selecting a preferred alternative was not to maximize benefits for the most resources, but rather to find an alternative dam operating plan that would permit recovery and long-term sustainability of downstream resources while limiting hydropower capability and flexibility only to the extent necessary to achieve recovery and long-term sustainability.

Based on the impact analysis described in the final EIS, three of the alternatives are considered to be environmentally preferable. They are: the Moderate Fluctuating Flow Alternative, the Modified Low Fluctuating Flow Alternative, and the Seasonally Adjusted Steady Flow Alternative. Modified Low Fluctuating Flow is selected for implementation because it satisfies the critical needs for sediment resources and some of the habitat needs of native fish, benefits the remaining resources, and allows for future hydropower flexibility, although there would be moderate to potentially major adverse impacts on power operations and possible decreases in long-term firm power marketing. Nearly all downstream resources are dependent to some extent on the sediment resource. This alternative meets the critical requirements of the sediment resource by restoring some of the pre-dam variability through floods and by providing a long-term balance between the supply of sand from Grand Canyon tributaries and the sand-transport capacity of the river. This, in turn, benefits the maintenance of habitat. The critical requirements for native fish are met by pursuing a strategy of warming releases from Glen Canyon Dam, enhancing the sediment resource, and substantially limiting the daily flow fluctuations.

The decision process for selecting the preferred alternative for the EIS followed a repetitive sequence of comparisons of effects on downstream resources resulting from each alternative. Alternatives resulting in unacceptable adverse effects on resources (such as long-term loss of sandbars leading to the destruction of cultural resource sites and wildlife habitat) were eliminated from further comparisons. Comparisons continued until existing data were no longer available to support assumed benefits.

All resources were evaluated in terms of both positive and adverse effects from proposed alternatives. Once it was determined that all alternatives would deliver at least 8.23 million acre feet of water annually, water supply played a minor role in subsequent resource evaluations. (One of the objectives of the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs" is a minimum annual release of 8.23 million acre feet of water from Glen Canyon

Dam.) The alternatives covered a range of possible dam operations from maximum utilization of peaking power capabilities with large daily changes in downstream river levels (Maximum Powerplant Capacity Alternative) to the Year-Round Steady Flow Alternative that would have eliminated all river fluctuations and peaking power capabilities. Within this range, the Maximum Powerplant Capacity, No Action, and High Fluctuating Flow alternatives were eliminated from consideration as the preferred alternative because they would not meet the first criterion of resource recovery and long-term sustainability. Data indicated that while beneficial to hydropower production, these alternatives would either increase or maintain conditions that resulted in adverse impacts to downstream resources under no action. For example, under these alternatives, the sediment resource would not likely be maintained over the long-term.

At the other end of the range, the Year-Round Steady Flow Alternative was also eliminated from consideration as the preferred alternative. This alternative would result in the greatest storage of sand within the river channel, the lowest elevation sandbars, the largest potential expansion of riparian vegetation, and the highest white-water boating safety benefits. However, it would not provide the variability on which the natural processes of the Grand Canyon are dependent (e.g. beach building, unvegetated sandbars, and backwater habitats). A completely stable flow regime would encourage the growth of vegetation thereby reducing bare-sand openings and patches of emergent marsh vegetation. This would limit beach camping and reduce the habitat value of these sites. With respect to other resources, this alternative did not provide any benefits beyond those already provided by other alternatives. Steady flows could also increase the interactions between native and non-native fish by intensifying competition and predation by non-natives on native fish. Such interactions would reach a level of concern under steady flows. Finally, this alternative would have major adverse impacts on hydropower (power operations and marketing).

The Existing Monthly Volume Steady Flow Alternative was eliminated from selection as the preferred alternative for reasons similar to those discussed above for the Year-Round Steady Flow Alternative.

Although the Interim Low Fluctuating Flow Alternative performed well over the interim period (August 1991 to the present), long-term implementation of this alternative would not restore some of the pre-dam variability in the natural system. The selected Modified Low Fluctuating Flow Alternative is an improved version of the Interim Low Fluctuating Flow Alternative because it would provide for some pre-dam variability through habitat maintenance flows.

The three remaining alternatives--the Moderate Fluctuating, Modified Low Fluctuating, and Seasonally Adjusted Steady Flow Alternatives-- provide similar benefits to most downstream resources (e.g.. vegetation, terrestrial wildlife, and cultural resources) with respect to increased protection or improvement of those resources (see Table II-7 in the EIS). The Moderate Fluctuating Flow Alternative provided only minor benefits to native fish over no action conditions because of the relative similarity in flow fluctuations; and the benefits from the Seasonally Adjusted Steady Flow Alternative were uncertain given the improvement in habitat conditions for non-native fish this alternative would provide. Seasonally adjusted steady flows also would create conditions significantly different from those under which the current aquatic ecosystem has developed in the last 30 years and would adversely affect hydropower to a greater extent than the

other two alternatives. The Modified Low Fluctuating Flow could substantially improve the aquatic food base and benefit native and non-native fish. The potential exists for a minor increase in the native fish population.

Although the Moderate Fluctuating, Modified Low Fluctuating, and Seasonally Adjusted Steady Flow Alternatives provide similar benefits to most downstream resources, the Modified Low Fluctuating Flow Alternative was selected as the preferred alternative because it would provide the most benefits with respect to the original selection criteria, given existing information. This alternative would create conditions that promote the protection and improvement of downstream resources while maintaining some flexibility in hydropower production. Although there would be a significant loss of hydropower benefits due to the selection of the preferred alternative (between $15.1 and $44.2 million annually) a recently completed non-use value study conducted under the Glen Canyon Environmental Studies indicates that the American people are willing to pay much more than this loss to maintain a healthy ecosystem in the Grand Canyon. The results of this non-use value study are summarized in Attachment 3 of the ROD.

The results of a General Accounting Office (GAO) audit mandated by the Grand Canyon Protection Act are in Attachment 4 of the ROD. This audit generally concludes that Reclamation used appropriate methodologies and the best available information in determining the potential impact of various dam flow alternatives on important resources. However, GAO identified some shortcomings in the application of certain methodologies and data, particularly with respect to the hydropower analysis. Reclamation's assumptions do not explicitly include the mitigating effect of higher electricity prices on electricity demand (price elasticity). GAO also determined that Reclamation's assumptions about natural gas prices were relatively high and that two computational errors were made during the third phase of the power analysis. According to GAO, these limitations suggest that the estimated economic impacts for power are subject to uncertainty. GAO also found limitations with some of the data used for impact analysis. Certain data was incomplete or outdated, particularly data used in assessing the economic impact of alternative flows on recreational activities. Nevertheless, the National Research Council peer reviewed both the Glen Canyon Environmental Studies and the EIS, and generally found the analysis to be adequate. The GAO audit concluded that these shortcomings and limitations are not significant and would not likely alter the findings with respect to the preferred alternative and usefulness of the document in the decision-making process. The audit also determined that most of the key parties (83 percent of respondents) support Reclamation's preferred alternative for dam operations, although some concerns remain.

ATTACHMENT 1.

Specific peer reviewed sediment studies:

Beus, S. and C. Avery. 1993. The influence of variable discharge regimes on Colorado River sand bars below Glen Canyon Dam. Glen Canyon Environmental Studies, Report PHY0101, Chapters 1 through 7. Northern Arizona University, Flagstaff, AZ

Beus, S., M.A. Kaplinski, J.E. Hazel, L. A. Tedrow, and L. H. Kearsley. 1995. Monitoring the effects of interim flows from Glen Canyon Dam on sand bar dynamics and campsite size in the Colorado River corridor, Grand Canyon National Park, AZ. Glen Canyon Environmental Studies, Report PHY 0112. Northern Arizona University, Flagstaff, AZ

Budhu, M and R. Gobin. 1994. Monitoring of sand bar instability during the interim flows: a seepage erosion approach. Glen Canyon Environmental Studies, Report PHY 0400. University of Arizona, Tucson, AZ

Carpenter, M., R. Carruth, Fink, D. Boling, and B. Cluer. 1995. Hydrogeology of sand bars 43.1 and 172.3L and the implications on flow alternatives along the Colorado River in the Grand Canyon. Glen Canyon Environmental Studies, Report PHY 0805. U.S. Geological Survey, Tucson, AZ

Cluer, B. 1993. Annual Report. Sediment mobility within eddies and the relationship to rapid erosion events. Glen Canyon Environmental Studies, Report PHY 011. National Park Service, Ft. Collins, CO

Cluer, B. and L. Dexter. 1994. An evaluation of the effects of the interim flows from Glen Canyon Dam on the daily change of beach area in Grand Canyon, AZ. Glen Canyon Environmental Studies, Report PHY 0109. Northern Arizona University, Flagstaff, AZ

Nelson, J., N. Andrews, and J. MacDonald. 1993. Movement and deposition of sediments from the main channel to the eddies of the Colorado River in the Grand Canyon. Glen Canyon Environmental Studies, Report PHY 0800. U.S. Geological Survey, Boulder, CO

Randle, T.J., R.I. Strand, and A. Streifel. 1993. Engineering and environmental considerations of Grand Canyon sediment management. In: Engineering Solutions to Environmental Challenges: Thirteenth Annual USCOLD Lecture, Chattanooga, TN. U.S. Committee on Large Dams, Denver, CO.

Schmidt, J. 1994. Development of a monitoring program of sediment storage changes in alluvial banks and bars, Colorado River, Grand Canyon, AZ. Glen Canyon Environmental Studies, Report PHY 0401. Utah State University.

Smith, J. and S. Wiele. 1994. Draft report. A one-dimensional unsteady model of discharge waves

in the Colorado River through the Grand Canyon. Glen Canyon Environmental Studies, Report PHY 0805. U.S. Geological Survey, Boulder, CO

Werrell, W., R. Ingliss, and L. Martin. 1993. Beach face erosion in Grand Canyon National Park: A response to ground water seepage during fluctuating flow releases from Glen Canyon Dam. Glen Canyon Environmental Studies, Report PHY 0101, Chapter 4 in The influence of variable discharge regimes on Colorado River sandbars below Glen Canyon Dam, Report PHY 0101. National Park Service, Ft. Collins, CO

ATTACHMENT E

Surplus Criteria Proposal by Six States

This attachment is a December 4, 1998 document prepared by representatives of Arizona, Nevada, New Mexico, Colorado, Utah, and Wyoming presenting their joint recommendations on interim surplus criteria.

Proposal for Interim Lake Mead Reservoir Operation Criteria Related to Surplus, Normal, and Shortage Year Declarations

Prepared by Representatives of the States of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming in Response to the Draft California 4.4 Plan

December 4, 1998

I. Introduction

The States of Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming ("Six States") are encouraged by the progress presently being made by the Colorado River water users within the State of California, who are endeavoring to formulate a defined, enforceable program to reduce California's dependence on Colorado River water over its basic entitlement. If implemented as envisioned, California's plan to gradually step-down from its current use of over 5.2 million acre-feet ("maf") of Colorado River water to its basic apportionment amount of 4.4 maf over a ten-to-fifteen year period will be a significant accomplishment.

The California 4.4 Plan, however, is greatly dependent upon using Colorado River water made available from surplus declarations on the Colorado River as a way to ease the State's transition to living within its basic apportionment. The other Colorado River Basin States have been, up to now, unwilling to enter into discussions on operating criteria that would accommodate California's plan. The reason for this reticence is obvious--new reservoir operating criteria on the Colorado River must only be an interim measure while California steps down its Colorado River water use. The temporary criteria cannot be viewed as a means to continue California's utilization of Colorado River water above its basic entitlement. Therefore, the Six States have insisted that California demonstrate a tangible commitment to reduce its water use before entertaining discussions of transitory reservoir operating criteria that might facilitate that reduction.

The Six States now believe that a reasonable draft plan has been formulated by California and sufficient commitment to the plan's implementation has been demonstrated by water users in California to allow the initiation of discussions on special interim reservoir operating criteria. The purpose of this paper is to describe the parameters of the interim criteria that would be acceptable

to the Six States. These parameters are consistent with and based upon the principles described in the paper issued by the Six States on October 20, 1998 titled Background and Principles for Negotiation – Special Interim Criteria for Releases of Water from Lake Mead During Implementation of the California 4.4 Plan.

II. Consistency with the Law of the River

It goes without saying that any interim operating criteria implemented to assist California in its program to eliminate its dependence on Colorado River water above its basic apportionment must be consistent with the Law of the River. Of particular importance in developing the interim criteria will be the apportionment system decreed by the United States Supreme Court under which water diverted into any of the three Lower Division States must fit within one of three categories:

1.) The water diverted is within that state's basic apportionment. Article II(B)(1) of the Decree, 374 U.S. 340 (1964).

2.) The water diverted is water that has been declared by the Secretary of the Interior as surplus water available above the 7.5 maf basic apportionment available to the Lower Division States. It must also be recognized that, of any amount declared to be available as surplus, only 50% of that amount is available to California, unless Arizona or Nevada choose not to divert and use the 46% and 4% of the surplus amount that is available to those states, respectively. Article II(B)(2).

3.) The water diverted is water that was available to one of the other Lower Division States in accordance with a) or b), above, but was unused by that state. Article II(B)(6).

III. Other Policy Considerations

In addition to the need for the interim reservoir operating criteria to be consistent with the existing Law of the River, the Six States assert that, as a matter of fairness to all Colorado River Basin States, the process of developing and promulgating interim criteria shall be consistent with the following principles:

1.) The federal government and California must affirmatively recognize that interim operating criteria are only temporary. The interim operating criteria will be in effect only during the transition period in which California reduces its dependence upon Colorado River water. Thus, the interim operating criteria must expire by their own terms no later than 2015. However, the interim criteria will also expire at an earlier date if it is established that California has achieved its goal of living within its basic 4.4 maf annual apportionment.

2.) California must commit to implementing its 4.4 Plan as quickly as possible. If, during the implementation phase of the Plan, it appears reasonable that the goal can be achieved more quickly than allowed for in the Plan, California must agree to take those steps reasonable to hasten achievement of the goal.

The Draft California 4.4 Plan proposed a two phased implementation process. The Six States accept the reasonableness of that approach, but disagree on the proposed time frame for implementation of the second phase. Rather than waiting for the completion of phase 1 core programs to begin phase 2, the Six States believe that phase 2 programs should be initiated by the year 2005. This policy is based on the desire for California to complete the entire reduction to 4.4 maf by the year 2015. This schedule provides six years for planning and environmental compliance, followed by ten years for implementation.

3.) For the reasons discussed above, the federal government and California must affirmatively recognize that there is a direct relationship between the continuation of the interim operating criteria and California's continued commitment and implementation of its plan to reduce its Colorado River water use to its legal entitlement of 4.4 maf/yr. At any point that there is demonstrated a diminishment or lack of commitment by California to achieve its goal as quickly as is practical, the interim operating criteria must be terminated.

4.) The interim criteria cannot be adopted without a parallel commitment among the Colorado River Basin States and the United States to determine how the River will be operated during periods of water shortage. The interim criteria providing surplus supplies will likely diminish the amount of Colorado River water in storage and thus increase the risk of water shortages on the river. While California will gain the greatest benefit under surplus criteria, it will place a greater risk of shortages on the other Lower Division States. Therefore, it is inherently

unfair to Arizona and Nevada to adopt interim criteria without developing in parallel an understanding of how shortages on the river will be managed. The existence of water shortage management criteria is essential if those states are to adequately analyze the increased risks they would face from the interim surplus criteria.

5.) The United States and the Colorado River Basin States must commit to ongoing studies and analysis to examine whether the interim surplus operating criteria are causing an increased risk of water shortages to Arizona and Nevada. In this process, all parties must reach a mutual understanding of how increased risk will be measured.

6.) California must agree to mitigate any increased risk of shortage to Arizona and Nevada. That mitigation might be accomplished through several techniques including a waiver by California of the shortage protection it is afforded by 43 U.S.C. § 1521(b)or, by California agreeing to store in Arizona through the excess capacity available to the Arizona Water Banking Authority, water that could be used to compensate Arizona and Nevada for any increased water shortages they suffer due to the interim operating criteria. Impacts of this interim criteria on the Upper Basin States would be minimized by measures such as the establishment of interim 602 (a)storage criteria or through other mutually agreed-upon measures.

7.) Interim operating criteria provisions that would provide extra municipal and industrial water for California during that state's reduction in water use transition period must be designed to provide only that amount of water that is needed by California M&I users after other sources currently available to the state have been used.

The Metropolitan Water District of Southern California ("MWD") holds California priority 4 and 5 rights under the Seven Party Agreement to a total of 1.212 maf. The Six States believe that if this volume of water can be provided, the California 4.4 Plan's goal of keeping MWD's Colorado River Aqueduct "essentially full" will be satisfied.

The Six States believe that the volume of surplus water to be made available to MWD must first take into account water unused by higher priority users within California. The Draft 4.4 Plan sets forth a schedule which phases down California's overall demand for water as conservation measures are being implemented. What the Draft 4.4 Plan does not indicate is the amount of unused water that may be available from more senior water uses (present perfected

rights and agricultural districts) which could keep the Colorado River Aqueduct full without requiring additional surplus deliveries. The Six States fully anticipate and expect that the water use of the more senior agricultural users will be carefully monitored by California and the Bureau of Reclamation and to the extent the irrigation districts do not use water within their contract entitlements, that water will be made available to MWD, thereby reducing the need for surplus releases from Lake Mead.

Likewise, to the extent that unused Arizona or Nevada basic apportionment can be made available to California users under the provisions of Article II(B)6 of the Decree, that water also must be counted against MWD's needs prior to determining the need for any surplus water derived under the interim criteria.

8.) To the extent that these interim criteria operate to provide extra water to municipal and industrial water users in Southern California, municipal and industrial water users in the other Lower Division States must be afforded the same opportunity, within the allocations defined by the Law of the River. For example, if the Secretary declares a surplus, it must be recognized that municipal and industrial water users in Nevada and Arizona would also be entitled to water above the states' basic apportionments to meet their needs.

9.) The Six States are well aware that the revised Draft 4.4 Plan calls for a considerable amount of groundwater banking within California at sites in the Cadiz Basin, Hayfield/Chuckwalla Basin, and Desert/Coachella Basin. These proposals will depend upon the availability of surplus Colorado River water. The Six States are concerned that under some circumstances these off stream banking proposals will lower reservoir levels to the point where the following year a "space building" type surplus will not be declared. The interim operating criteria proposed in the Draft 4.4 Plan insulates MWD from the effects of this condition by merely triggering a "Level 2 surplus" which still will keep the Colorado River Aqueduct full. The Six States believe that off stream banking of surplus water must be limited to only those years when a reservoir spill would otherwise be imminent.

IV. Proposed Lake Mead Reservoir Interim Operating Criteria

A. Introduction

The December 17,1997, Draft of the California 4.4 Plan outlined a proposal for Lake Mead reservoir operations. The Six States agree with many of the concepts set forth in that proposal. However, there are several areas in which those concepts deviate from the principles discussed above and thus are in need of further definition, discussion and clarification. This section briefly identifies those areas and proposed additional concepts.

The Draft California 4.4 Plan describes three levels of surplus criteria. Level 1 is a spill avoidance strategy based on anticipated runoff. Level 2 is a strategy that attempts to keep the Colorado River Aqueduct full during the transition period during which agricultural conservation measures are being implemented within California. Level 3 is similar to Level 2, except that the surplus supplies are more limited, and California is required to use additional alternate supplies including dry year land fallowing and groundwater basin pumping options if it wishes to keep the Aqueduct full.

The Six State proposal envisions a set of interim criteria for reservoir operation in which the various levels are less distinct. The Six State proposal seeks to achieve a balance between the need to release water to build storage space to avoid future flood control regulation dictated releases and the need to carry over as much water in storage as possible to sustain future water deliveries through droughts. Similar to the California proposal, the Six States are willing to provide California with additional water for a specified period of time while conservation measures are being implemented. The States believe that when California is successful in implementing programs for conservation transfers to M&I uses it will be able to meet its future needs within its basic 4.4 maf annual entitlement and, therefore, there will be no need to continue the proposed form of interim reservoir operating criteria in the future.

Underlying all levels of the interim criteria is the commitment to attempt to meet the needs of southern California municipal and industrial water users which are causing the state to use more than its 4.4 maf basic apportionment. While this volume is expected to reduce continuously over time, it is still a significant amount of water , especially in the early years of the Plan's implementation. The Six State proposal also includes water for municipal uses in Southern

Nevada to meet Nevada's M&I needs above its basic apportionment of 0.3 maf after about the year 2005.

B. Tiered Surplus Strategy

The Six State proposal for Lake Mead operation, like the California 4.4 Plan proposal, envisions a tiered water management approach. In order to meet the objective of providing additional water to MWD and the Southern Nevada Water Authority ("SNWA"), Arizona must agree, under certain circumstances, to temporarily waive all or a portion of its legal entitlement to 46% of any surplus. The Six State tiered approach allows Lower Basin demands to be met incrementally based on designed surplus releases under certain reservoir conditions and anticipated runoff. The tiered approach steps are summarized as follows:

1.) Normal Year

During the period while the proposed interim criteria are in place, normal years will be declared only when available Lake Mead storage is at or below elevation 1125 (13.569 maf content). This represents about 3.8 maf of available storage capacity above the minimum power pool. This amount of storage will allow a minimum of five years of normal year deliveries through a drought cycle represented by the 33rd percentile lowest five year average of historic runoff. At the end of the five-year period, the reservoir elevation would be at 1083, which is the minimum power head (9.764 maf content). While this elevation is greater than the protection level proposed for declaration of shortages, the Six States feel that surplus declarations must be terminated 5 years before power production is impacted, rather than 5 years before the SNWA water intake structure is impacted.

In a normal year, California will be limited to 4.4 maf of consumptive use, and Nevada will be limited to 0.3 maf of consumptive use, unless unused apportionment is available from Arizona.

2.) Partial M&I Surplus

During the interim period, MWD and SNWA will be allowed to increase orders which would result in California's and Nevada's consumptive uses exceeding their basic apportionments. Under the partial surplus tier, the surplus volume would not be large enough to keep the Colorado River Aqueduct full nor to meet all of the potential needs of the SNWA. The volume of surplus

will be dependent on the water demands in the given year, reduced by the conservation opportunities the entities have to provide additional supplies in dry years. The dry year options are expected to include land fallowing opportunities, groundwater importation, and recovery of water that had been previously banked within California or possibly in the Arizona Water Bank. The combination of these programs may yield as much as 250,000 acre feet per year in California. SNWA would probably rely on recovery of water from the Arizona Water Bank as its dry year option and would be required to reduce its surplus demand above 300,000 af by one-half.

The partial M&I surplus tier will be implemented when Lake Mead storage is between elevation 1125 and elevation 1145 (15.585 maf). The volume of the partial M&I surplus will vary yearly and will decline over time as California proceeds toward its 4.4 maf legal entitlement. It will be equal to the volume needed to deliver 1.212 maf through the MWD Colorado River Aqueduct, considering the amount of core transfer programs already in place, less 250,000 af. When California has reduced its demand to 4.65 maf or lower, the extra water made available through the partial M&I surplus tier will be zero.

3.) Full M&I Surplus

During periods when Lake Mead content is above elevation 1145, but less than the amount which would initiate a surplus under the space building or flood control criteria described below, limited surpluses would be declared that would meet the goal of keeping the Colorado River Aqueduct full and meeting the needs of the SNWA. The volume of this surplus, as it relates to the Colorado River Aqueduct, would be the difference between the amount of water necessary to keep the aqueduct full (1.212 maf) and the amount that MWD already has available to it from sources within California's 4.4 maf basic apportionment. MWD's available supply includes its own priority 4 and 5 entitlements under the Seven Party Agreement, the amount conserved through core conservation programs that have been implemented, and any unused apportionment from more senior California contractors. The overall Lower Basin surplus, i.e. the amount of delivery above 7.5 maf, would also be reduced to the extent there is Arizona or Nevada unused basic apportionment. The volume of water available to SNWA would be that amount needed for M&I purposes within SNWA's service area above Nevada's basic apportionment of 0.3 maf. Current projections indicate that SNWA may not need additional surpluses until about the year

2005. Surpluses made available under the full M&I surplus tier would only be used for delivery to meet direct use needs in that calendar year and may not be used to refill carryover storage in off-mainstream reservoirs or for groundwater banking programs.

4.) Additional Surpluses Based on Space Building to Contain Above-Average Runoff

This tier refers to interim reservoir operating criteria that will allow additional surplus amounts to be made available to create reservoir storage space in anticipation of above normal runoff. A surplus strategy based on enhanced space building criteria was proposed by the Bureau of Reclamation based on studies performed following the 1983 flood events on the Colorado River. In January, 1986, the Bureau issued a special report titled Colorado River - Alterative Operating Strategies for Distributing Surplus Water and Avoiding Spills. This report suggested operating strategies for avoiding Lake Mead spills that went beyond the Corps of Engineers flood control criteria, but were, in essence, based on similar principles. Under these criteria, limited surpluses would be determined based on the need to provide adequate storage capacity for an assumed runoff rather than the actual yearly forecast. The Six States propose that the assumed runoff be the value of the 70th percentile of exceedance based on the historic record which is equivalent to about 17.33 maf runoff above Lake Powell. Technical studies have named this strategy "70R."

In recent years, the Bureau of Reclamation has investigated a number of surplus strategies including "spill avoidance," "flood control avoidance," and "shortage avoidance." All of these methods have positives and negatives associated with them. The Six States believe that the "70R" strategy is the best for use during this interim period because any surplus water provided is incremental to the previous tier of a full M&I surplus. In other words, the surplus strategy is not necessary to provide additional water for high value M&I uses since those needs will have already been met. The increment of use that could be available above M&I would likely be for additional groundwater banking and perhaps additional agricultural water in California, Arizona, or Mexico. The Six States do not believe it is prudent to apply surplus strategies that make additional water available based on statistical spill avoidance analysis which will present a higher risk, if the incremental water benefits are limited to groundwater banking and agricultural purposes. The Six State proposal will make water available for such purposes in years when the "70R" strategy

indicates that additional water should be released for beneficial use in lieu of potential release through the flood control criteria. If incremental surplus volumes are limited under this tier, priority must be given to groundwater banking for future M&I needs within California over agricultural uses. Agricultural uses in California should be limited to those years when the "70R" criteria results in large surplus volumes and there is a high degree of certainty that water would otherwise be subject to spill.

5.) Flood Control criteria

This tier refers to the current Corps of Engineers criteria for space building in Lake Mead that is necessary to avoid damaging levels of downstream flood releases. The flood control criteria is not, per se, a surplus strategy. Rather it is a strategy to use reservoir space to be able to reduce peak inflows so that outflow rates can be reduced to non-damaging levels. The surplus strategy relationship develops when the Corps criteria call for reservoir releases to be made at levels above downstream delivery requirements. Rather than let that volume be spilled to the Gulf of California, this tier of surpluses are designed to allow increased beneficial use in the Lower Division States and Mexico.

The Corps has defined specific volumes of storage space that must be left vacant during certain months of the year depending on forecast volumes to accommodate spring runoff or other unanticipated weather events. They have also mandated specific release rates by month to achieve these vacant storage spaces. In order to avoid the "dumping" of water in order to build storage space, provisions will be made which would allow the Lower Division States to schedule additional water for delivery. The volume of extra water available for delivery is equal to the amount that must be evacuated from storage, above regularly scheduled downstream demands, to meet the space requirements. Under some conditions, such as when the reservoirs are starting the year very full and when the forecast runoff is above average, the amount of flood control release could be several million acre feet. Under other circumstances, the space building formula may be such that only small volumes of water would need to be evacuated. However, since flood control related releases are generally associated with very full reservoir conditions, the Six State proposal would allow any and all beneficial uses to be met, including unlimited off stream groundwater banking and additional water for Mexico.

V. Shortage Determination Criteria

The Six States believe that considering current reservoir conditions and with prudent system management, the Secretary of the Interior should not have to declare a shortage condition for many years. Even with this recognition, the Six States believe that the establishment of shortage criteria that work in conjunction with the *interim* criteria is valuable for two primary reasons. First, the Arizona Water Bank has been created within Arizona primarily to store water underground over the next twenty years to mitigate the effects of future shortages to Arizona municipal water users. Shortage criteria are critical for Water Bank planning. The volumes of water that Arizona will withdraw as *either* basic apportionment or surplus apportionment over the next ten to twenty years is highly dependent on the need for water banking that will be used as shortage protection. Secondly, shortage criteria are needed to be able to identify any negative impacts created by the implementation of the temporary surplus criteria. All Six States, and especially Arizona and Nevada, want to be able to identify when the release of water to California from either the partial or full M&I surplus tiers, causes an increased risk of shortage. This analysis can only be performed if the shortage criteria are known.

The Bureau of Reclamation has been studying options for shortage criteria for a number of years. The framework for most of these strategies is to declare limited cutbacks well in advance of the point where those levels are critical. The most junior Lower Division water user, the Central Arizona Project, bears the burden of most of the delivery reduction. The timing of the reduction is based on the use of computer models to simulate reservoir operations. The model study focuses on the statistical probability of reservoir levels dropping below a critical "protect" level. The Six States endorse this framework and propose to adopt the protect level in Lake Mead of elevation 1050 (7.471 maf content) which is the elevation of the intake structure for the Southern Nevada Water Project. The Bureau of Reclamation has named this shortage strategy "80P1050." In accordance with the Bureau's studies, this level would not be guaranteed but the risk of drawing down to below that level would be limited to 20%. When the model studies indicate that the reservoir level is in jeopardy, a first tier shortage would be declared which would reduce Arizona's consumptive use by the CAP and other similar priority users to no more than 1,000,000 acre feet (about a 500,000 af reduction). Nevada would also share in shortages, but to

a much more limited extent. If reservoir conditions continue to deteriorate, additional cuts in use by CAP will be required.

VI. Overrun Accounting

The Draft California 4.4 Plan includes a provision that allows individual entitlement holders to exceed their yearly apportionment. The proposed overrun would be constrained by a maximum allowable accrual and would be subject to repayment in subsequent years. The overrun accounting provision is tied to the administration of agricultural entitlements.

The Six States are concerned with the overrun provisions. First, as the Colorado River enters into an era of limits, the States expect the Bureau of Reclamation to strictly enforce its contracts and the entitlements. In essence, within the Lower Basin, the Bureau must play the role of the State Engineer and enforce current limits on diversions by water users. Secondly, the Six States are leery of proposals that would allow significant diversions above the amount of water allowed to a state in shortage, normal, or limited surplus years according to the proposal described in this paper. It would be extremely inequitable to allow California agricultural districts to overrun their diversions by 10%, which is over 300,000 acre feet, while at the same time calling for the Central Arizona Project to reduce diversions by 500,000 acre feet because a shortage had been declared.

In spite of these significant concerns, the Six States do recognize that there may be limited occasions when inadvertent overruns will occur. Due to the fact that the annual entitlement of a junior priority district is dependent on the actual use by a senior priority user, there may be occasions when a district will order water only to find out later that it had exceeded its contract entitlement. This matter is further compounded in the Lower Basin because a state's apportionment is for consumptive use rather than diversions. Until the books are reconciled to calculate diversions less measured and unmeasured return flows, it may not be possible to know whether or not an overrun has occurred until the after-the-fact accounting is completed.

The Six States propose that a limited form of overrun accounting be instituted. It must be based on the following principles:

1.) Overruns must be inadvertent.

2.) Overruns may not exceed 7% of annual entitlement.

3.) Overruns must be repaid the following year by the entity that benefitted from the extra water unless the following year's operation is controlled by the flood control regulation and water must be released beyond downstream demands.

VII. Control of Illegal Diversions and Uses

The implementation of interim reservoir operating criteria cannot stand alone in the water management of the Lower Colorado River. The Six States' concern about California's continuing use of Colorado River water above its basic apportionment is an indicator that they believe that the era of limits in the Lower Basin has begun. In order to implement and enforce these limits so that other states or individual water entitlement holders are not adversely impacted, the Bureau of Reclamation must move forward with its identification of Lower Basin water users who are either exceeding contract entitlements or are diverting water without a contract. The Bureau must take steps necessary to require more accurate measurement and reporting of diversions. It must also develop accurate techniques for determining both measured and unmeasured return flows to the river. The issues of withdrawal of Colorado River water from wells must be dealt with either by adopting a modified version of the "bright line" approach currently being considered by the Bureau or by some other scientifically and legally valid approach. The Bureau must consult with the affected states and water users before proposing any final regulation, but it should establish a schedule and process to undertake this necessary step.

VIII. Conclusion

The Governor's representatives of the States of Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming have stated on numerous occasions their desire to work with representatives of California to develop and implement a plan that will, over time, eliminate California's dependence on Colorado River water above its 4.4 maf basic apportionment. One critical component of that plan is the implementation of interim Lake Mead reservoir operating criteria that will provide California M&I entities greater security of supply through the Colorado

River Aqueduct than currently exists. The Six State Representatives conditioned their willingness to work on mutually agreeable interim operating criteria on California's commitment to enter into a defined, enforceable program to reduce its dependence on Colorado River water over its basic entitlement in a way that avoids undue risk of shortage to other Basin States. While California has not yet completed the 4.4 Plan that will create the framework for the defined, enforceable program that the Six States require, it has made meaningful progress. In recognition of that progress and in order to move the discussions forward, last October the Six States set forth their principles for defining the interim operating criteria. They have now added additional explanation and detail to those principles.

The Six State proposal is based on a number of legal and policy considerations. Critical to these considerations is that the interim operating criteria must be accomplished within the existing "Law of the River." Also, any risk of future shortages resulting from the interim operating criteria be must be borne by those who benefitted. The proposal for surplus determination is similar in approach to that proposed in the December 1997 Draft California 4.4 Plan, but contains differences in several of the specific provisions. The Six States also believe that issues of shortage criteria, overrun accounting, and control of illegal diversions and uses must be addressed and have suggested how those issues should be resolved.

The representatives of the Six States believe that this proposal should be viewed as a positive step toward the successful completion and implementation of the California 4.4 Plan. They believe the time has come to expedite discussions with California's representatives on these critical Colorado River issues.

ATTACHMENT F

Surplus Criteria Proposal by California

This attachment contains a document prepared by agencies in California presenting their recommendations on interim surplus criteria. This document was published as Exhibit A of an October 15, 1999 document entitled *Key Terms for Quantification of Settlement Among the State of California, IID, CVWD and MWD*.

EXHIBIT A:

SURPLUS CRITERIA FOR MANAGEMENT OF THE COLORADO RIVER

Need For Development of Revised Interim Surplus Criteria

The Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs (LROC) reflect the multiple purposes for which the reservoir system is operated. Resource management requires the optimization of the operation of the Colorado River System reservoirs to satisfy the growing needs of these purposes. The Colorado River has been widely developed through great investments by the federal government and many water and power agencies to provide system storage of more than 60 million acre-feet. The reservoir system and its extensive storage allows the operation of the Colorado River to be efficiently managed so as to optimize the beneficial use of this resource which supports more than 20 million people and multi-billion dollar farm and business economies.

The governing view of river operations during the development of the LROC anticipated that the level and growth of water needs for this period and beyond would be such that little or no surplus water would occur, and did not contemplate a prolonged interim period of surplus water. Most efforts relating to reservoir operations in the development of the LROC focused on shortage criteria. Consequently, Colorado River management has the consequence of maximizing the amount of water held in storage in the near term. This strategy tends to force more flood control releases in wet years, in excess of downstream needs and the ability to divert and store such water for subsequent use. In dry years, this strategy leans towards not releasing water to users even though there is a high probability for the next fifteen years of surplus water

releases in excess of needs and the ability to store and divert such water. Overall, this strategy does not optimize the beneficial use of this valuable resource because it does not take full advantage of the high volume of storage created by the extensive infrastructure on the river. It was also envisioned in the 1968 Colorado River Basin Project Act that there would be a federal augmentation of the flow of Colorado River. In the absence of augmentation, the ability to optimize the use of available surplus water and to store water off-stream is essential.

Revised interim surplus criteria are needed to guide reservoir operations to increase the reasonable and beneficial use of surplus water while keeping risk of shortages minimal. Specific criteria would provide for more effective and efficient use of Colorado River water by providing for steadier releases over longer periods of time. This would reduce the need for flood control releases in excess of the downstream needs, and increase the ability to divert and store such water for subsequent use.

Surplus criteria based on these principles would promote water use efficiency, and provide increased reliability and predictability to Colorado River water users. Predictability would allow water agencies to more effectively plan for the future, and more efficiently allocate limited resources as appropriate. More predictable releases could also benefit the planning required for developing the Lower Colorado River Multi-Species Conservation Program.

A. Implementation of Surplus Criteria

Revised interim surplus criteria should preferably be developed pursuant to Article III(3) of the LROC. These surplus criteria would be used in conjunction with the LROC to develop the annual operating plan (AOP). In this way, the surplus criteria will provide a high degree of

certainty by adoption through a formal process with public comment and input, and publication in the Federal Register. Certainty is enhanced through the five-year review process already present in the LROC which requires consultation with the Basin states and water users, before changes to the surplus criteria can be implemented. By keeping reviews of the surplus criteria on a five-year time frame, agencies can develop data and gain experience on how the surplus criteria are operating without reacting to annual fluctuations.

By the same token, the five-year review process in the LROC provides flexibility through a process in which the surplus criteria can be adjusted without requiring a lengthy administrative process. The AOP consultation process will serve to put parties on notice of any concerns regarding the operation of the surplus criteria, which can then be addressed through the five-year review. This orderly process will prevent sudden or unilateral changes to the surplus criteria while providing flexibility to adapt the surplus criteria to changed conditions as circumstances warrant.

The current schedule for development of surplus criteria by the Department of the Interior calls for circulation of final NEPA documentation in December 2000, with a Record of Decision by January 2001. This schedule allows the surplus criteria to provide the sought for benefits and certainty within a reasonable timeframe.

B. Revised Surplus Criteria

Revised interim surplus criteria, also referred to as "River Re-operations", are based on a strategy of optimizing use of existing storage to make available the maximum amount of surplus water while keeping risk of shortages to a minimum during at least the first fifteen-year period of

the California Quantification Settlement, and possibly beyond. This allows for an efficient use of the existing supply of Colorado River water by utilizing storage to reduce flood control releases. The use of revised surplus criteria during this period also allows California to achieve a "soft landing", avoiding severe supply impacts and lengthy legal disputes over water rights, in implementing the California Plan to reduce annual Colorado River water usage to 4.4 million acre-feet when required.

The proposed surplus criteria specifically use elevations at Lake Mead as a trigger, instead of the previous concept, which used avoidance of flood control releases as the trigger. This management strategy uses three levels of surplus water releases with elevation triggers that are adjusted periodically to reflect real world conditions in the Colorado River Basin.

The proposed surplus criteria provide significant surplus water benefits to California, Arizona, and Nevada--allowing for beneficial use of water that would otherwise likely be lost. River modeling indicates that the risk of shortage to Arizona and Nevada is quite slight, and even these small risks can be mitigated. For instance, with regard to shortage risk for the Central Arizona Project caused by revised surplus criteria, there would be a zero percent likelihood of shortage through 2010, and a 1 to 6 percent likelihood from 2011 through 2015. Withdrawing prior surplus water from groundwater storage could completely offset the likelihood of shortage through 2015. Such surplus criteria would provide for more effective use of surplus water, and provide greater benefits to California, Arizona, and Nevada than under previous proposals.

The proposed three levels of surplus criteria are as follows:

Level 1 Surplus Release – Level 1 surplus releases will be based on a Lake Mead elevation at or above 1,160 feet (17.6 million acre-feet (MAF) in storage at Lake Mead) starting in 2001 and rising to 1,166 feet (18.4 MAF in storage) by 2015. The trigger elevations will be adjusted based on demands within the Upper Basin. Actual trigger levels will be based on reality and have the ability to be adjusted depending on the real usage of Colorado River water. If the Upper Basin demand for a given calendar year differs from the current assumed projection of demand, the elevation levels will be adjusted upward or downward by 1-foot for every 1.7 percent change in the Upper Basin demands. Level 1 surplus releases will be available to Arizona, California and Nevada for all direct uses or off-stream storage based on the current surplus allocation (46%-50%-4%, respectively). Storage water is essential for increasing water supply reliability during inevitable shortage or normal years. Any water apportioned to but unused in any state will be available for use in the other states.

Level 2 Surplus Release – Level 2 surplus releases will be based on a Lake Mead elevation at or above 1,116 feet (13.0 MAF in storage) in 2001 (but below the Level 1 surplus of 1,160 feet in that year) and rising to 1,125 feet (13.9 MAF in storage) in 2015 (but below the Level 1 surplus of 1,166 feet in that year). Here again, the trigger elevation will be subject to adjustment over time. If the Upper Basin demand for a given calendar year differs from the current assumed projection of demand, the elevation levels will be adjusted upward or downward by 1-foot for every 1.1 percent change in the Upper Basin demands. Under a Level 2 surplus declaration, surplus water will be made available for the following uses: Metropolitan will keep the Colorado River Aqueduct full, the Southern Nevada Water Authority will meet water needs in its service area, and the Central Arizona Project will meet water needs in its service area. In

keeping the Colorado River Aqueduct full, Metropolitan will divert water conserved and available to Metropolitan under the IID/MWD Water Conservation Program, the IID-SDCWA Transfer, and the All American and Coachella Canal lining projects before diverting Level 2 surplus water. Surplus water will not be made available for any other agricultural uses. Surplus water may be stored for municipal and industrial uses only. Any water apportioned to but unused in any state will be available for use in the other states.

Level 3 Surplus Releases -- Level 3 surplus releases will be based on a Lake Mead elevation at or above 1,088 feet (10.5 MAF in storage) in 2001 (but below the Level 2 surplus of 1,116 feet in that year) and rising to 1,098 feet (11.3 MAF in storage) in 2015 (but below the Level 2 surplus of 1,125 feet in that year). Here again, the trigger elevation will be subject to adjustment over time. If the Upper Basin demand for a given calendar year differs from the current assumed projection of demand, the elevation levels will be adjusted upward or downward by 1 foot for every 1 percent change in the Upper Basin demands. Under a Level 3 surplus declaration, surplus water will be made available to satisfy Indian and urban demands; Metropolitan will keep the Colorado River Aqueduct full, the Southern Nevada Water Authority will meet water needs in its service area, and the Central Arizona Project will meet urban and Indian water needs in its service area. In keeping the Colorado River Aqueduct full, Metropolitan will divert water conserved and available to Metropolitan under the IID/MWD Water Conservation Program, the IID-SDCWA Transfer, the All American and Coachella Canal lining projects, and an additional 100,000 acre-feet from other sources annually, before diverting Level 3 surplus water. The additional 100,000 acre-feet will come either from already banked off-stream storage or an option type program similar to the MWD-PVID Test Land Fallowing

Program. Surplus water will not be made available for agricultural uses or for off-stream storage. Any water apportioned to but unused in any state will be available for use in the other states.

ATTACHMENT G

Surplus Criteria Proposal by Pacific Institute

This attachment contains correspondence from the Pacific Institute for Studies in Development, Environment, and Security. Included are a February 15, 2000 letter report presenting their proposed alternative for interim surplus criteria and an excerpt from their September 8, 2000 letter of comment on the DEIS, in which they propose certain modifications of the alternative proposed in February. The entire text of their September 8, 2000 letter is reproduced in Volume III.

American Rivers · Defenders of Wildlife · Environmental Defense · Friends of Arizona Rivers
Glen Canyon Institute · Grand Canyon Trust · Land and Water Fund of the Rockies
Pacific Institute for Studies in Development, Environment, and Security
Sierra Club · Sonoran Institute

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Department of the Interior
1849 C Street, NW
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Robert Johnson
Regional Director
Lower Colorado River Region
Bureau of Reclamation
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RE: Colorado River Interim Surplus Criteria

February 15, 2000

Dear Mr. Hayes and Mr. Johnson:

On behalf of American Rivers, Defenders of Wildlife, Environmental Defense, Friends of Arizona Rivers, Glen Canyon Institute, Grand Canyon Trust, Land and Water Fund of the Rockies, the Pacific Institute for Studies in Development, Environment, and Security, Sierra Club, and the Sonoran Institute, we submit the following set of interim surplus criteria. We support the development of interim surplus criteria that would facilitate California's reduction in demands on the Colorado River to 4.4 million acre-feet (maf) per year by the year 2015. Yet, absent explicit environmental safeguards, interim surplus criteria for the Colorado River could have long-term negative impacts on the Colorado River Delta. We write to ensure that the needs of the Delta are recognized and satisfied as California implements its 4.4 Plan. We submit the following general set of interim surplus criteria as an alternative that would balance the municipal and industrial (M&I) water needs of Southern California and Southern Nevada with the instream flow requirements of the lower Colorado River and its Delta. We urge you to consider these interim criteria in the upcoming draft Environmental Impact Statement.

In his speech before the Colorado River Water Users Association in Las Vegas last December, the Secretary of the Interior described an important environmental baseline that should inform the development of interim surplus criteria. The Secretary stated that surpluses must be determined and allocated with *no net loss* of environmental benefits. "No net loss" sets an important minimum standard and is a welcome commitment by the Secretary.

Background

Historically, prior to the construction of dams, diversions, and other reclamation projects, millions of acre-feet of Colorado River water flowed every year through the Colorado River Delta and into the Upper Gulf of California, supporting tremendous levels of biological productivity and diversity. The Delta has been degraded as human demands have dramatically reduced the amount of water reaching the Delta. Except for years with unusually high run-off, virtually the entire flow of the Colorado is now captured and used before reaching the river's mouth. However, even without the historic flows, the remnants of the Delta and Upper Gulf still comprise the largest and most critical desert wetland in North America, as well as one of the world's most diverse and productive marine ecosystems. In recent years, flood release flows from upstream dams have prompted the re-emergence of ecologically valuable riparian habitat and have been strongly correlated with a rise in the shrimp catch in the Upper Gulf, an indication of the renewed viability of an important estuary. In 1993, Mexico affirmed the importance of the region and designated it a Biosphere Reserve, which has since received international recognition.

At its upper reaches, the Delta is dominated by vegetation such as cottonwoods and willows, offering more than twice the amount of native riparian habitat found in the entire reach of the river in the United States from Hoover Dam to Morelos Dam. The native riparian vegetation of the lower Colorado River and the Delta evolved in response to occasional flood events; such flows must be replicated to ensure the continued viability of these species. The middle extent of the Delta contains extensive backwaters filled by occasional floods, providing valuable wetland habitat for migratory birds as well as a myriad of local species. The Delta supports several species listed by the U.S. Fish & Wildlife Service, including southwestern willow flycatchers (*Empidonax traillii extimus*), Yuma clapper rails (*Rallus longirostris yumanensis*), totoaba (*Totoaba macdonaldi*) and desert pupfish (*Cyprinodon macularius*), while the river's estuary is home to the vaquita porpoise (*Phocoena sinus*), the world's most endangered marine mammal.

Interest in the Delta of the Colorado River has grown markedly in the past decade. Scientists from Mexico and the United States are studying the physical and biological characteristics of the region, increasing our understanding of its value not only as a desert wetland and stopover on the Pacific Flyway, but also as a species reservoir for the lower Colorado River as a whole. Historically, plant and animal species moved upstream to re-colonize the riparian corridor of the lower Colorado after periodic large-magnitude floods devastated that reach of the river. Recent, preliminary research indicates that the quantity of Colorado River baseline flows necessary to sustain the upper reaches of the Delta on an annual basis is at least 32,000 acre-feet, with periodic flood flows of at least 260,000 acre-feet every four years, on average, to promote seedling recruitment.[1] These instream flows thus represent the minimum quantities necessary to prevent a net loss of environmental

[1] See Glenn, Edward P., Valdes-Casillas, Carlos, "Importance of United States' Water Flows to the Colorado River Delta and the Northern Gulf of California, Mexico," unpub. October 13, 1998, at 14; and Luecke et al., *A Delta Once More*, Washington, DC: EDF Publications, June 1999.

benefits in the upper reaches of the Delta. (Such flood flows would also have a demonstrable salutary effect on the lower reach of the Colorado River within the United States, freshening backwaters and promoting germination of native vegetation.) Ongoing research will further improve our understanding of the ecosystems of the Delta and Upper Gulf. This research will also describe the instream flow requirements of other elements of the system. When they become available, these refined assessments of instream flow requirements should be incorporated into the interim surplus criteria described in the following.

No Net Loss

The Secretary's "no net loss" standard should be applied to the losses to the Delta from allocating "surplus" water to California and to any other potential losses in the United States or Mexico. No water shall be considered surplus until the Secretary has been assured, through a plan for releases of sufficient instream flows, mitigation, reservoir management, and other measures, that additional consumptive use would cause no net loss of the environmental benefits that would result if the potential "surplus" were left in the river. Water is surplus only if those benefits are maintained by flows or through mitigation. Managing water available in the river after satisfying the lower basin and Mexican apportionments could benefit riparian areas or wetlands or fish and wildlife or endangered species or water quality, in the United States and/or in Mexico. If there is scientific evidence that these benefits would be lost by consuming the water, no determination of surplus shall be made until the loss of those benefits can be mitigated.

An assessment of the environmental benefits that could accrue if the erstwhile surplus water were not consumed is therefore a prerequisite to allocating surpluses. Conducting such an assessment will require a well-funded adaptive management program for the Delta that includes monitoring and research. Such a program should be an integral component of the interim surplus criteria. Such an adaptive management program is necessary to understanding the environmental baseline and satisfying the Secretary's no net loss standard.

Discretion

Allocation of surplus water, over and above the basic lower basin apportionment, is a discretionary function of the Secretary that can and should be exercised consistent with other responsibilities incumbent upon him for allocating the benefits of the river, planning its use, and protecting its resources. Past decisions on development, basic allocations, and operations were made before most of those other responsibilities had been articulated under laws and policies of the United States. This has resulted in serious environmental harm. Given this situation, the Secretary can and should use his discretion in this more enlightened era to the maximum extent possible to ensure that his decisions result in no further harm and, wherever possible, in an improvement of environmental quality.

Environmental needs must be met before any quantity of discretionary water is dedicated to consumptive uses. Until then it is not truly "surplus." Environmental losses

were perhaps unfortunate consequences of the basic allocations embedded in the law of the river and related development; but they need not be perpetuated when the Secretary has discretion over whether and when to allocate additional water. The Secretary recognized as much when he insisted that the surpluses must be determined and allocated with no net loss of environmental benefits.

Surplus Criteria

We support the development of interim surplus criteria to guide the Secretary of the Interior's decision to determine a surplus condition for the Colorado River. We agree that interim surplus criteria should facilitate California's reduction in consumptive use of Colorado River water down to California's entitlement of 4.4 maf/year. Since the objective is California's successful and timely implementation of a 4.4 Plan, surplus criteria should be interim and should be explicitly linked to California's diligent and timely reduction of demand on Colorado River water. We are in general agreement with the principle offered by the Six States' proposal that interim surplus criteria should be directed towards providing greater security of supply through the Colorado River Aqueduct (CRA), after all other potential sources of Colorado River water are exhausted. We further agree that the declaration of surplus under the interim criteria should be explicitly linked to California's diligent implementation of water conservation strategies as specified in the 4.4 Plan, and that surplus allocations should be suspended in the absence of such implementation. In any case, these interim criteria should expire in 2015.

Absent a prolonged above-average cycle of precipitation in the Upper Basin and explicit environmental safeguards, the interim surplus criteria would reduce Colorado River reservoir storage, in turn decreasing the likelihood of the flood release and space-building flows that sustain the Colorado River Delta, undermining efforts to restore and preserve the Delta and violating the Secretary's no net loss standard.

Prior to the implementation of interim surplus criteria, there must be a guaranteed delivery of water to the Delta. Surplus conditions should not be declared until sufficient water is identified and scheduled to be delivered to meet the water needs of the Delta, as described above. Article II(A) of the Supreme Court Decree (1964) states that "river regulation" and flood control are the Secretary's first priority in managing the Colorado River, precedent over deliveries for consumptive uses. "River regulation" has yet to be satisfactorily defined; today it necessarily encompasses the full range of the Secretary's authority and missions under current law including but not limited to fish and wildlife, recreation, water quality, and conservation of endangered species. As a first priority under the Decree, "river regulation" would therefore permit the delivery of water to the Delta as described below.

We recommend an interim tiered strategy to meeting the needs of both the Delta and the municipal and industrial needs of California's coastal plain and of southern Nevada. This tiered strategy is a modified version of that proposed by the Six States in December 1998. In this modified approach, guarantees of delivery to satisfy the baseline needs of

the Delta would be made before any surplus flows for M&I could be allocated in the United States or Mexico. In the tiered interim surplus strategy outlined in the following, surplus agricultural deliveries could only be scheduled after the Secretary makes his no net loss determination as described above, including scheduling the necessary delta flood flows. Diversions for off-stream storage and groundwater banking would be permitted from flood release flows.

Proposed Interim Surplus Criteria

We recommend that the Interim Surplus Criteria contain the following provisions:

No water shall be considered surplus until the Secretary has been assured, through a plan for releases of sufficient instream flows, mitigation, reservoir management, and other measures, that additional consumptive use would cause no net loss of the environmental benefits that would result if the potential "surplus" were left in the river. If there is scientific evidence that these benefits would be lost by consuming the water, no determination of surplus shall be made until the loss of those benefits can be mitigated. The Secretary shall make a no net loss determination before releases at any of the three surplus tiers — partial M&I, full M&I, or full surplus.

The Secretary's no net loss determination shall be based on an assessment of the lower Colorado River as a whole, including the Colorado River Delta. Conducting such an assessment will require a well-funded adaptive management program for the Delta that includes monitoring and research. Current research, based on empirical evidence from the past decade, suggests that the baseline and Delta flood flow releases described below may serve as interim mitigation measures. The Delta flow requirements and other conditions necessary to achieve no net loss shall be adjusted from time to time as the Secretary deems appropriate based on scientific and technical information.

The surplus criteria described below are interim and are intended to expire in 2015.

1) **Normal Year**
   Normal years will be declared when available Lake Mead storage is at or below elevation 1120.4 (13.40 maf storage). This level will allow a minimum of five years of normal year deliveries through a drought cycle represented by the 34th percentile lowest five year average of historic runoff. At the end of the five-year period, the reservoir elevation would be at 1083, which is the minimum power head (9.764 maf content).

2) **Baseline Delta Flows**
   When Lake Mead storage is above elevation 1120.4, the Bureau of Reclamation will deliver at least 32,000 af to the Delta.[2] These waters shall be released on a consistent, regular basis, to provide a perennial flow for the upper reaches of the Delta.

[2] Quantities of water determined sufficient to provide baseline and flood flows for the Colorado River Delta shall be adjusted periodically through adaptive management based on ongoing research and data

3) **Partial M&I Surplus**
Equivalent to the Six States' 1998 proposal, that releases will be dependent on the water demands in the given year, reduced by the conservation opportunities available in dry years. This tier yields a maximum surplus of about 412,000 af for California and half of Nevada's demonstrated surplus demand. Total volume of this tier is equivalent to that needed to deliver 1.212 maf through the CRA, considering the amount of core transfer programs already in place, less 250,000 af. This tier is implemented between Lake Mead elevation 1125 and elevation 1145, upon a "no net loss" determination by the Secretary, as described above, and based on such conditions and operational changes as the Secretary may require.

4) **Full M&I Surplus**
Equivalent to the Six States' 1998 proposal. This would effectively make available an additional 250,000 af for MWD, after other sources had been exhausted, and would satisfy southern Nevada's full M&I needs. In this tier, surpluses could not be used for offstream storage, groundwater banking, or agricultural uses. This tier is triggered at Lake Mead elevation 1145, upon a "no net loss" determination by the Secretary, as described above, and based on such conditions and operational changes as the Secretary may require.

5) **Delta Flood Flows**
This tier is triggered by the Bureau of Reclamation's 70 percent flood control avoidance (70A1) elevation, which is the elevation required on January 1 to avoid flood control releases with a 70% assurance over the next sixty years. This is a slightly more liberal definition of surplus than the Bureau's "70R" criteria. When the surface of Lake Mead exceeds this elevation at the beginning of the year, the Bureau will deliver at least 260,000 af to the Delta.[2] These waters shall be released as late in the Spring as possible without violating Army Corps of Engineers flood control release guidelines.

6) **Full Surplus**
Upon a "no net loss" determination by the Secretary, as described above, and based on such conditions and operational changes as the Secretary may require, this tier is triggered when an assumed runoff, set at the 70th percentile of exceedance (roughly 17.3 maf), less uses and losses and delta flood flows, would cause Lake Mead elevation on January 1 to exceed the required system space capacity of 5.35 maf. In this tier, agricultural uses would be permitted, in addition to the M&I permitted in previous tiers.

Shortage Criteria

The implementation of surplus criteria based upon demand rather than supply, as is the case with the California 4.4 Plan and current efforts to develop security of supply through the CRA, will increase the likelihood of shortage conditions on the river in future years. The Department of the Interior should define shortage criteria so that stakeholders

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collection.

will be better able to project future supply and plan accordingly. The Record of Decision should commit the Department of the Interior to commencing rulemaking and appropriate environmental reviews at once, leading to setting shortage criteria that will based on principles consistent with those that guide the surplus criteria, including protection against net loss of environmental benefits.

Mexico and the Delta

If at any time surplus flows intended to benefit the Delta are intercepted and consumed by users within Mexico, further deliveries of surplus waters for such purposes shall cease unless and until Mexico enters into a commitment to prevent future releases from being diverted and consumed and to guarantee their delivery to the Delta.

Mexico and Surplus

Article 10 of the 1944 Treaty with Mexico grants the International Boundary and Water Commission (IBWC) the discretion to determine surplus flows to Mexico. It is therefore beyond the scope of the current process to set surplus criteria for Mexico.

Thank you for the opportunity to participate in this important process.

Sincerely,

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Francisco Oyarzabal Tamargo, Comision Nacional del Agua
Lic. José Samaniegos, SEMARNAP

Excerpts from

Pacific Institute Comments

on the

Colorado River
Interim Surplus Criteria
Draft Environmental Impact Statement

A report of the

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The following information is excerpted from an attachment to the Pacific Institute's letter of September 8, 2000 commenting on the Colorado River Interim Surplus Criteria Draft EIS.

PACIFIC INSTITUTE PROPOSAL

The "Environmental Interim Surplus Criteria," submitted by ten NGOs and subsequently endorsed by the Center for Biological Diversity and The Wilderness Society, should be analyzed in a supplemental DEIS. These criteria would satisfy the objective of facilitating California's reduction in its use of Colorado River water, without forcing the environment to bear the costs of such actions. Although similar in many respects to the Six States Plan, the Environmental Criteria differ sufficiently to merit appraisal in a supplemental DEIS.

In the following, and per previous conversations and correspondence with Reclamation staff, we offer suggestions as to how best to model the Environmental Interim Surplus Criteria, and suggest several specific projections that should be included in the supplemental DEIS.

Clarifications:

- Reclamation should model the monthly release schedule under "2) baseline delta flows" so that these delta flows are relatively constant throughout the year
- Reclamation should model the monthly release schedule under "5) delta flood flows" so that 100% of such releases are made from May through July, peaking in June at a ratio of 35%: 45%: 20% (flows in other months would be released by the baseline flow trigger, above)
- Due to difficulties in modeling a Secretarial determination of "No Net Loss," for the purposes of modeling Reclamation should assume that such a determination is made

Differences between the Environmental Criteria ("NGO") and the 7 States' Plan ("States"):

- **Normal elevation trigger**: ≤ 1120.4 for NGO, ≤ 1125 for States
- **Baseline delta flows** 0.032 MAF above elevation 1120.4 for NGO; none for States
- **Partial M&I/Domestic surplus elevation** triggered between 1125 & 1145 for both; for purposes of these modeling runs, the quantities of water released under the two plans are equivalent
- **Full M&I/Domestic Surplus** triggered above elevation 1145. NGO plan equivalent to States' plan with the following exceptions: Total deliveries through the Colorado River Aqueduct would be limited to 1.212 million acre-feet under the NGO plan instead of 1.250 under the States' plan
- **Delta Flood Flows** triggered by Reclamation 70 percent flood control avoidance elevation (70A1) under the NGO plan; no such release under the States'

- **Full Surplus/Quantified Surplus** 70R trigger for both plans, although for the purposes of determining the trigger elevation the NGO plan considers the above delta baseline and flood flows as "uses" and the States plan does not (so the trigger elevation will be higher under the NGO plan). Unlike the States' plan, under the NGO plan, no water would be made available to California or Nevada for off-stream storage, including groundwater banking, under this tier, and no surplus water would be made available to Arizona for such purposes under this tier.
- **Flood Control Surplus** equivalent for the two plans
- **Shortage Criteria** the NGO plan does not establish shortage criteria

ATTACHMENT H

Lower Division Depletion Schedules

This attachment contains schedules of projected depletions (consumptive use) of Colorado River system water by the Lower Division States. These schedules were used in the Colorado River Simulation System to model the river system operation under baseline conditions and the alternatives.

Attachment H

Lower Division Depletion Schedules

Overview

This attachment to the Colorado River Interim Surplus Criteria FEIS consists of the depletion schedules for the Lower Division states (17 tables) that were used to simulate the Colorado River water demands under the modeled baseline conditions and each of the surplus alternatives. These schedules contain the states' projections of future water needs. Separate schedules were used for normal, surplus, and shortage conditions. Schedules used for more than one alternative and/or baseline conditions are hereafter noted accordingly. It should be noted that the data presented in this attachment is model input data and should not be confused with the model output data discussed in Section 3.3.4 and 3.4 of the main document.

Normal Depletion Schedules With and Without California Transfers

The surplus alternatives (Basin States, California, Flood Control, Six States, and Shortage Protection alternatives) and the baseline conditions used normal schedules that included proposed California intrastate water transfers.

A breakdown of the depletions for the major diverters in each state is included in the appropriate schedule. Smaller diversions are aggregated into a single amount that is referred to as "Other Users" (i.e. Other AZ Users). Table H-1 presents a summary of the Lower Basin depletion schedule that shows depletions for the major diverters and other users by state as well as a total for the lower basin. The "other user's" depletion schedules (from Table H-1) for the states of Arizona, California and Nevada are shown in more detail on Tables H-3, H-4 and H-5, respectively.

The baseline conditions were also modeled without California intrastate water transfers and the results were evaluated in a sensitivity analysis (see Attachment L). The California intrastate water transfers affect the schedules of MWD, CVWD and IID only. The depletion schedule for these entities under the baseline without transfers modeled conditions are also presented in Table H-2. It should be noted that the transfers were based on Reclamation's interpretation of the original California 4.4 Plan (December 1997) and subsequent discussions with the State of California with respect to data changes. It should also be noted that IID's depletion schedule under these modeled conditions reflects IID's most recent 10-year average depletion.

The California Alternative normal schedule is shown in Table H-11. This schedule is not to be confused with the depletion schedules that were used to model the four other surplus alternatives (Basin States, Flood Control, Six States, and Shortage Protection alternatives). Under the California Alternative, PVID is assumed to transfer 100,000 acre-feet to the MWD under normal conditions. This modeling assumption is indicative of the type of intrastate water transfer that might occur under the California Plan and is not intended to imply that the transfer will occur. The depletion schedules of the rest of

the California users, as well as for the states of Arizona and Nevada remained unchanged from the normal schedules used to model the other alternatives.

For all normal schedules, Arizona depletions for the first four years (2002 through 2005) are below its 2.8 million acre-feet (maf). Arizona's unused apportionment is distributed as follows:

- Metropolitan Water District of Southern California (73 percent of unused apportionment), and
- Southern Nevada Water Authority (27 percent of unused apportionment)

Shortage Depletion Schedules

Under shortage conditions, the model used operating rules to determine the shortage condition deliveries, instead of using specific shortage schedules, as discussed in Section 3.3.3.

Under a Level 1 shortage condition, the CAP deliveries are reduced to one mafy and the SNWA receives a delivery reduction equal to four percent of the total shortage amount. The model computes and allocates these Level 1 shortage condition deliveries in years when the modeled conditions render a Level 1 shortage condition. Table H-6 presents a summary of the Lower Division depletion schedule with the reduced CAP and SNWA depletions under a Level 1 shortage condition. The California normal depletion amount is included to show a total for the lower basin after a Level 1 shortage is computed.

A Level 2 shortage condition occurs if the Lake Mead water surface elevation drops below 1000 feet msl. Under a Level 2 shortage condition, the deliveries to the CAP and SNWA are further reduced, as needed, to maintain the Lake Mead water level at 1000 feet msl. If the Lake Mead water level continues to drop and if the CAP deliveries are reduced to zero, then at that time, the deliveries to MWD and Mexico would also be reduced, as needed, to maintain the Lake Mead water surface level at 1000 feet msl. CAP deliveries of zero were not observed in the simulations conducted as part of this FEIS.

Surplus Depletion Schedules

For the baseline conditions and Shortage Protection Alternative, the full surplus depletion schedule was used to model deliveries under surplus water supply conditions. Under a full surplus condition, the full amount of surplus water requested by each agency with a surplus water contract is delivered.

Furthermore, a full surplus delivery would be available under baseline conditions and all surplus alternatives when water is released from Lake Mead in excess of lower basin demands due to flood control regulations. Under these conditions, the model will assume delivery of up to the annual full surplus schedules, depending upon which month the flood control begins. Once a flood control surplus is determined, it remains in effect for the remainder of that calendar year. The full surplus schedules are shown in Table H-7. It should be noted that this schedule includes the California intrastate

water transfers. The only difference between the full surplus schedules of the with transfers and without transfers conditions is the IID depletion. IID's full surplus amount without transfers is equal to a constant 3,240,000 afy, while the full surplus amount with transfers is equal to 250,000 afy plus IID's normal schedule from Table H-1. The full surplus schedules for the baseline without transfers condition are shown in Table H-8.

The Six States Alternative used a "tiered" surplus strategy, making different amounts of water available under each tier (or level) as specified for the Lake Mead elevation triggers. The first level is identical to the baseline (70R), and therefore uses the full surplus schedules with transfers. The second and third level surplus schedules for the Six State alternative are shown in Tables H-9 and H-10, respectively.

The California Alternative also used a "tiered" surplus strategy, making different amounts of water available under each tier (or level) as specified for the Lake Mead elevation triggers. The first and second level surplus schedules for the California Alternative are shown in Tables H-12 and H-13 and do not include the transfer of 100,000 acre-feet to MWD from PVID's schedule. The third level surplus schedules are shown in Table H-14 and again would transfer 100,000 acre-feet to MWD. Surplus water deliveries to Arizona and Nevada occur only in the first level of surplus and are full surplus deliveries. No surplus deliveries to Arizona and Nevada would take place in the second or third levels.

The Basin States Alternative also used a "tiered" surplus strategy (similar to that of the Six States Alternative) making different amounts of water available under each tier (or level) as specified for the Lake Mead elevation triggers. The first level of surplus is shown in Table H-15. The second and third level surplus schedules are shown in Table H-16 and Table H-17, respectively.

The contents of Tables H-1 through H-17 are listed on the following tabulation.

LISTING OF TABLES	
H-1	Normal Schedules with California Intrastate Transfers (kaf)
H-2	Normal Schedules without California Intrastate Transfers (kaf)
H-3	State of Arizona - Other Users (kaf)
H-4	State of California - Other Users (kaf)
H-5	State of Nevada - Others Users (kaf)
H-6	Lower Division Level 1 Shortage Schedules (kaf)
H-7	Full Surplus Schedule with California Transfers (kaf)
H-8	Full Surplus without California Intrastate Transfers (kaf)
H-9	Six State Alternative Level 2 Surplus Schedules (kaf)
H-10	Six State Alternative Level 3 Surplus Schedules (kaf)
H-11	California Plan Normal Schedules (kaf)
H-12	California Plan Surplus Schedules Level 1 (kaf)
H-13	California Plan Surplus Schedules Level 2 (kaf)
H-14	California Plan Surplus Schedules Level 3 (kaf)
H-15	Basin States Plan Surplus Schedules Level 1 (kaf)
H-16	Basin States Plan Surplus Schedules Level 2 (kaf)
H-17	Basin States Plan Surplus Schedules Level 3 (kaf)

Table H-1
Normal Schedules with California Intrastate Transfers (kaf)

Year	CALIFORNIA					ARIZONA			NEVADA			TOTAL
	CA Others	MWD	IID	CVWD	CA TOTAL	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	L.B.
2002	444	645	2959	360	4407	1332	1458	2790	26	277	303	7500
2003	445	674	2939	354	4412	1337	1447	2784	26	278	304	7500
2004	446	758	2902	350	4455	1342	1382	2724	27	294	321	7500
2005	447	743	2882	356	4427	1348	1415	2763	28	282	310	7500
2006	449	784	2811	356	4400	1353	1447	2800	28	272	300	7500
2007	451	802	2786	361	4400	1359	1441	2800	28	272	300	7500
2008	454	819	2761	366	4400	1364	1436	2800	29	271	300	7500
2009	456	837	2736	371	4400	1369	1431	2800	29	271	300	7500
2010	459	855	2711	376	4400	1375	1425	2800	29	271	300	7500
2011	463	870	2686	381	4400	1375	1425	2800	29	271	300	7500
2012	468	865	2681	386	4400	1376	1424	2800	29	271	300	7500
2013	472	861	2676	391	4400	1376	1424	2800	29	271	300	7500
2014	477	856	2671	396	4400	1377	1423	2800	29	271	300	7500
2015	482	852	2666	401	4400	1378	1422	2800	29	271	300	7500
2016	482	852	2661	406	4400	1378	1422	2800	29	271	300	7500
2017	482	852	2656	411	4400	1379	1421	2800	29	271	300	7500
2018	482	852	2651	416	4400	1380	1420	2800	29	271	300	7500
2019	482	852	2646	421	4400	1380	1420	2800	29	271	300	7500
2020	482	852	2641	426	4400	1381	1419	2800	29	271	300	7500
2021	482	852	2636	431	4400	1382	1418	2800	29	271	300	7500
2022	482	852	2631	436	4400	1383	1417	2800	29	271	300	7500
2023	482	852	2626	441	4400	1385	1415	2800	29	271	300	7500
2024	482	852	2621	446	4400	1386	1414	2800	29	271	300	7500
2025	482	852	2616	451	4400	1388	1412	2800	29	271	300	7500
2026	482	852	2611	456	4400	1389	1411	2800	21	279	300	7500
2027	482	852	2611	456	4400	1390	1410	2800	13	287	300	7500
2028	482	852	2611	456	4400	1392	1408	2800	13	287	300	7500
2029	482	852	2611	456	4400	1393	1407	2800	13	287	300	7500
2030	482	852	2611	456	4400	1394	1406	2800	13	287	300	7500
2031	482	852	2611	456	4400	1395	1405	2800	13	287	300	7500
2032	482	852	2611	456	4400	1396	1404	2800	13	287	300	7500
2033	482	852	2611	456	4400	1397	1403	2800	13	287	300	7500
2034	482	852	2611	456	4400	1398	1402	2800	13	287	300	7500
2035	482	852	2611	456	4400	1398	1402	2800	13	287	300	7500
2036	482	852	2611	456	4400	1399	1401	2800	13	287	300	7500
2037	482	852	2611	456	4400	1400	1400	2800	13	287	300	7500
2038	482	852	2611	456	4400	1401	1399	2800	13	287	300	7500
2039	482	852	2611	456	4400	1402	1398	2800	13	287	300	7500
2040	482	852	2611	456	4400	1402	1398	2800	13	287	300	7500
2041	482	852	2611	456	4400	1403	1397	2800	13	287	300	7500
2042	482	852	2611	456	4400	1403	1397	2800	13	287	300	7500
2043	482	852	2611	456	4400	1403	1397	2800	13	287	300	7500
2044	482	852	2611	456	4400	1404	1396	2800	13	287	300	7500
2045	482	852	2611	456	4400	1404	1396	2800	13	287	300	7500
2046	482	802	2661	456	4400	1404	1396	2800	13	287	300	7500
2047	482	802	2661	456	4400	1404	1396	2800	13	287	300	7500
2048	482	802	2661	456	4400	1405	1395	2800	13	287	300	7500
2049	482	802	2661	456	4400	1405	1395	2800	13	287	300	7500
2050	482	802	2661	456	4400	1405	1395	2800	13	287	300	7500

Table H-2
Normal Schedules without California Intrastate Transfers (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total
2002	444	644	2990	330	4407
2003	445	647	2990	330	4412
2004	446	690	2990	330	4455
2005	447	660	2990	330	4427
2006	449	631	2990	330	4400
2007	451	629	2990	330	4400
2008	454	626	2990	330	4400
2009	456	624	2990	330	4400
2010	459	621	2990	330	4400
2011	463	617	2990	330	4400
2012	468	612	2990	330	4400
2013	472	608	2990	330	4400
2014	477	603	2990	330	4400
2015	482	598	2990	330	4400
2016	482	598	2990	330	4400
2017	482	598	2990	330	4400
2018	482	598	2990	330	4400
2019	482	598	2990	330	4400
2020	482	598	2990	330	4400
2021	482	598	2990	330	4400
2022	482	598	2990	330	4400
2023	482	598	2990	330	4400
2024	482	598	2990	330	4400
2025	482	598	2990	330	4400
2026	482	598	2990	330	4400
2027	482	598	2990	330	4400
2028	482	598	2990	330	4400
2029	482	598	2990	330	4400
2030	482	598	2990	330	4400
2031	482	598	2990	330	4400
2032	482	598	2990	330	4400
2033	482	598	2990	330	4400
2034	482	598	2990	330	4400
2035	482	598	2990	330	4400
2036	482	598	2990	330	4400
2037	482	598	2990	330	4400
2038	482	598	2990	330	4400
2039	482	598	2990	330	4400
2040	482	598	2990	330	4400
2041	482	598	2990	330	4400
2042	482	598	2990	330	4400
2043	482	598	2990	330	4400
2044	482	598	2990	330	4400
2045	482	598	2990	330	4400
2046	482	598	2990	330	4400
2047	482	598	2990	330	4400
2048	482	598	2990	330	4400
2049	482	598	2990	330	4400
2050	482	598	2990	330	4400

Table H-3
State of Arizona - Other Users (kaf)

Date	Lake Mead NRA	Kingman	Ft. Mohave Ind. Res.	Mohave Valley I&DD	Mohave Valley M&I	Havasu NWR	Parker Ag.	Unused Depletion	Town of Parker & Other Users	Imperial NWR	Cibola NWR	CRIR	CRIR Pumped	Gila Gravity Main Canal	Cocopah Ind. Res.	City of Yuma	Yuma Co. WUA	Arizona Pumpers	Total Arizona Other
2002	0	0	46	25	4	5	14	0	18	9	6	343	0	549	25	25	267	10	1332
2003	0	0	50	25	4	5	13	0	19	9	6	351	0	543	13	25	264	10	1337
2004	0	0	55	24	4	5	13	0	19	9	6	359	0	537	13	25	262	10	1342
2005	0	0	60	24	4	5	13	0	20	9	7	367	0	531	13	25	259	10	1348
2006	0	0	63	24	4	5	13	0	21	10	7	376	0	526	13	26	257	10	1353
2007	0	0	65	24	4	5	13	0	22	10	7	386	0	521	13	26	255	10	1359
2008	0	0	68	23	4	5	13	0	22	10	8	395	0	516	12	26	252	10	1364
2009	0	0	70	23	4	5	13	0	23	10	8	405	0	510	12	26	250	10	1369
2010	0	0	73	23	4	5	13	0	24	10	8	414	0	505	12	27	248	10	1375
2011	0	0	73	22	4	5	12	0	24	10	8	424	0	499	12	27	245	10	1375
2012	0	0	73	22	4	5	12	0	24	10	8	434	0	494	12	27	242	10	1376
2013	0	0	73	21	4	5	12	0	24	10	8	443	0	487	12	27	239	10	1376
2014	0	0	73	20	4	5	12	0	24	10	8	453	0	482	12	27	237	10	1377
2015	0	0	73	20	5	5	12	0	24	9	8	463	0	477	12	27	234	10	1378
2016	0	0	73	19	5	5	12	0	25	9	8	463	0	476	12	28	234	10	1378
2017	0	0	73	19	5	5	12	0	25	9	8	463	0	477	12	28	234	10	1379
2018	0	0	73	18	5	5	12	0	26	9	8	463	0	477	12	29	234	10	1380
2019	0	0	73	18	5	5	12	0	26	9	8	463	0	476	12	29	234	10	1380
2020	0	0	73	17	5	5	12	0	27	9	8	463	0	477	12	30	234	10	1381
2021	0	0	73	17	5	5	12	0	27	9	9	463	0	477	12	30	233	10	1382
2022	0	0	73	17	5	5	12	0	27	9	10	463	0	476	12	31	233	10	1383
2023	0	0	73	17	5	5	12	0	28	10	10	463	0	477	12	32	233	10	1385
2024	0	0	73	17	5	5	12	0	28	10	11	463	0	477	12	32	232	10	1386
2025	0	0	73	17	5	5	12	0	28	10	12	463	0	477	12	33	232	10	1388
2026	0	0	73	17	5	5	12	0	29	10	13	463	0	477	12	33	232	10	1389
2027	0	0	73	17	5	5	12	0	29	10	14	463	0	476	12	34	231	10	1390
2028	0	0	73	17	5	5	12	0	29	10	14	463	0	477	12	34	231	10	1392
2029	0	0	73	17	6	5	12	0	30	10	15	463	0	477	12	35	230	10	1393
2030	0	0	73	17	6	5	12	0	30	10	16	463	0	476	12	35	229	11	1394
2031	0	0	73	17	6	5	12	0	30	10	16	463	0	476	12	36	229	11	1395
2032	0	0	73	17	6	5	12	0	30	10	16	463	0	476	12	36	230	11	1396
2033	0	0	73	17	6	5	12	0	30	10	16	463	0	476	12	37	230	11	1397
2034	0	0	73	17	6	5	12	0	31	10	16	463	0	477	12	38	230	11	1398
2035	0	0	73	17	6	5	12	0	31	10	16	463	0	476	12	38	229	11	1398
2036	0	0	73	17	6	5	12	0	31	10	16	463	0	476	12	39	229	11	1399
2037	0	0	73	17	6	5	12	0	31	10	16	463	0	476	12	39	230	11	1400
2038	0	0	73	17	6	5	12	0	31	10	16	463	0	477	12	40	230	11	1401
2039	0	0	73	17	6	5	12	0	32	10	16	463	0	477	12	40	230	11	1402
2040	0	0	73	17	6	5	12	0	32	10	16	463	0	476	12	41	229	11	1402
2041	0	0	73	17	6	5	12	0	32	10	16	463	0	477	12	41	230	11	1403
2042	0	0	73	17	6	5	12	0	32	10	16	463	0	477	12	41	230	11	1403
2043	0	0	73	17	6	5	12	0	32	10	16	463	0	476	12	41	230	11	1403
2044	0	0	73	17	6	5	12	0	33	10	16	463	0	477	12	41	230	11	1404
2045	0	0	73	17	6	5	12	0	33	10	16	463	0	477	12	41	230	11	1404
2046	0	0	73	17	6	5	12	0	33	10	16	463	0	477	12	41	230	11	1404
2047	0	0	73	17	6	5	12	0	33	10	16	463	0	476	12	41	230	11	1404
2048	0	0	73	17	6	5	12	0	34	10	16	463	0	477	12	41	230	11	1405
2049	0	0	73	17	6	5	12	0	34	10	16	463	0	477	12	41	230	11	1405
2050	0	0	73	17	6	5	12	0	34	10	16	463	0	476	12	41	230	11	1405

Table H-4
State of California - Other Users (kaf)

Year	Ft. Mohave Ind. Res.	City of Needles	Havasu NWR	Chemehuevi Ind. Res.	Others & Misc. PPRs	Imperial NWR	CRIR Ind. Res.	PVID	Unused Depletion	AAC Yuma Project Bard Unit	AAC Yuma Project Res. Unit Quechan	California Pumpers	Other Pumpers Below NIB	Total California Other
2002	14	1	0	2	2	0	5	383	0	18	19	0	0	444
2003	13	1	0	2	2	0	7	381	0	18	21	0	0	445
2004	13	1	0	3	2	0	8	380	0	18	22	0	0	446
2005	12	1	0	3	2	0	9	379	0	18	23	0	0	447
2006	12	1	0	3	2	0	11	378	0	18	24	0	0	449
2007	12	1	0	4	2	0	13	377	0	18	25	0	0	451
2008	12	1	0	4	2	0	15	375	0	18	27	0	0	454
2009	12	1	0	5	2	0	17	374	0	18	28	0	0	456
2010	12	1	0	5	2	0	19	373	0	18	29	0	0	459
2011	12	1	0	6	2	0	23	372	0	18	30	0	0	463
2012	12	1	0	6	2	0	27	370	0	18	32	0	0	468
2013	12	1	0	7	2	0	31	369	0	18	33	0	0	472
2014	12	1	0	7	2	0	35	367	0	18	35	0	0	477
2015	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2016	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2017	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2018	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2019	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2020	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2021	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2022	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2023	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2024	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2025	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2026	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2027	12	1	0	8	2	0	39	366	0	18	36	0	0	482

Table H-4
State of California - Other Users (kaf)

Year	Ft. Mohave Ind. Res.	City of Needles	Havasu NWR	Chemehuevi Ind. Res.	Others & Misc. PPRs	Imperial NWR	CRIR Ind. Res.	PVID	Unused Depletion	AAC Yuma Project Bard Unit	AAC Yuma Project Res. Unit Quechan	California Pumpers	Other Pumpers Below NIB	Total California Other
2028	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2029	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2030	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2031	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2032	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2033	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2034	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2035	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2036	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2037	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2038	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2039	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2040	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2041	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2042	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2043	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2044	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2045	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2046	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2047	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2048	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2049	12	1	0	8	2	0	39	366	0	18	36	0	0	482
2050	12	1	0	8	2	0	39	366	0	18	36	0	0	482

Table H-5
State of Nevada - Other Users (kaf)

Year	Laughlin M&I	Mohave Steam Plant	Ft. Mohave Ind. Res.	Total NV Other
2002	4	16	6	26
2003	4	16	6	26
2004	4	16	7	27
2005	4	16	8	28
2006	4	16	8	28
2007	4	16	8	28
2008	4	16	9	29
2009	4	16	9	29
2010	4	16	9	29
2011	4	16	9	29
2012	4	16	9	29
2013	4	16	9	29
2014	4	16	9	29
2015	4	16	9	29
2016	4	16	9	29
2017	4	16	9	29
2018	4	16	9	29
2019	4	16	9	29
2020	4	16	9	29
2021	4	16	9	29
2022	4	16	9	29
2023	4	16	9	29
2024	4	16	9	29
2025	4	16	9	29
2026	4	8	9	21
2027	4	0	9	13
2028	4	0	9	13
2029	4	0	9	13
2030	4	0	9	13
2031	4	0	9	13
2032	4	0	9	13
2033	4	0	9	13
2034	4	0	9	13
2035	4	0	9	13
2036	4	0	9	13
2037	4	0	9	13
2038	4	0	9	13
2039	4	0	9	13
2040	4	0	9	13
2041	4	0	9	13
2042	4	0	9	13
2043	4	0	9	13
2044	4	0	9	13
2045	4	0	9	13
2046	4	0	9	13
2047	4	0	9	13
2048	4	0	9	13
2049	4	0	9	13
2050	4	0	9	13

Table H-6
Lower Division Level 1 Shortage Schedule (kaf)

Year	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	4407	1332	1000	2332	26	258	284	7023
2003	4412	1337	1000	2337	26	260	286	7034
2004	4455	1342	1000	2342	27	278	305	7102
2005	4427	1348	1000	2348	28	265	293	7068
2006	4400	1353	1000	2353	28	253	281	7034
2007	4400	1359	1000	2359	28	254	282	7041
2008	4400	1364	1000	2364	29	253	282	7046
2009	4400	1369	1000	2369	29	253	282	7051
2010	4400	1375	1000	2375	29	253	282	7057
2011	4400	1375	1000	2375	29	253	282	7057
2012	4400	1376	1000	2376	29	253	282	7058
2013	4400	1376	1000	2376	29	253	282	7058
2014	4400	1377	1000	2377	29	253	282	7059
2015	4400	1378	1000	2378	29	253	282	7060
2016	4400	1378	1000	2378	29	253	282	7060
2017	4400	1379	1000	2379	29	253	282	7061
2018	4400	1380	1000	2380	29	254	283	7063
2019	4400	1380	1000	2380	29	254	283	7063
2020	4400	1381	1000	2381	29	254	283	7064
2021	4400	1382	1000	2382	29	254	283	7065
2022	4400	1383	1000	2383	29	254	283	7066
2023	4400	1385	1000	2385	29	254	283	7068
2024	4400	1386	1000	2386	29	254	283	7069
2025	4400	1388	1000	2388	29	254	283	7071
2026	4400	1389	1000	2389	21	262	283	7072
2027	4400	1390	1000	2390	13	270	283	7073
2028	4400	1392	1000	2392	13	270	283	7075
2029	4400	1393	1000	2393	13	270	283	7076
2030	4400	1394	1000	2394	13	270	283	7077
2031	4400	1395	1000	2395	13	270	283	7078
2032	4400	1396	1000	2396	13	270	283	7079
2033	4400	1397	1000	2397	13	270	283	7080
2034	4400	1398	1000	2398	13	270	283	7081
2035	4400	1398	1000	2398	13	270	283	7081
2036	4400	1399	1000	2399	13	270	283	7082
2037	4400	1400	1000	2400	13	270	283	7083
2038	4400	1401	1000	2401	13	270	283	7084
2039	4400	1402	1000	2402	13	270	283	7085
2040	4400	1402	1000	2402	13	270	283	7085
2041	4400	1403	1000	2403	13	270	283	7086
2042	4400	1403	1000	2403	13	270	283	7086
2043	4400	1403	1000	2403	13	270	283	7086
2044	4400	1404	1000	2404	13	271	284	7088
2045	4400	1404	1000	2404	13	271	284	7088
2046	4400	1404	1000	2404	13	271	284	7088
2047	4400	1404	1000	2404	13	271	284	7088
2048	4400	1405	1000	2405	13	271	284	7089
2049	4400	1405	1000	2405	13	271	284	7089
2050	4400	1405	1000	2405	13	271	284	7089

Table H-7
Full Surplus Schedule With California Intrastate Water Transfers (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	1250	3209	585	5487	1332	1658	2990	26	312	338	8815
2003	445	1250	3189	585	5468	1337	1647	2984	26	314	340	8792
2004	446	1250	3152	585	5432	1342	1582	2924	27	316	343	8699
2005	447	1250	3132	585	5413	1348	1615	2963	28	316	344	8720
2006	449	1250	3061	585	5344	1353	1652	3005	28	321	349	8698
2007	451	1250	3036	585	5322	1359	1680	3039	28	326	354	8715
2008	454	1250	3011	585	5299	1364	1715	3079	29	330	359	8737
2009	456	1250	2986	585	5276	1369	1750	3119	29	334	363	8758
2010	459	1250	2961	585	5254	1375	1787	3162	29	338	367	8783
2011	463	1250	2936	585	5233	1375	1812	3187	29	342	371	8791
2012	468	1250	2931	585	5233	1376	1835	3211	29	345	374	8818
2013	472	1250	2926	585	5233	1376	1835	3211	29	349	378	8822
2014	477	1250	2921	585	5232	1377	1835	3212	29	353	382	8826
2015	482	1250	2916	585	5232	1378	1835	3213	29	357	386	8831
2016	482	1250	2911	585	5227	1378	1835	3213	29	361	390	8830
2017	482	1250	2906	585	5222	1379	1835	3214	29	365	394	8830
2018	482	1250	2901	585	5217	1380	1835	3215	29	369	398	8830
2019	482	1250	2896	585	5212	1380	1835	3215	29	373	402	8829
2020	482	1250	2891	585	5207	1381	1835	3216	29	378	407	8830
2021	482	1250	2886	585	5202	1382	1835	3217	29	382	411	8830
2022	482	1250	2881	585	5197	1383	1835	3218	29	387	416	8831
2023	482	1250	2876	585	5192	1385	1835	3220	29	391	420	8832
2024	482	1250	2871	585	5187	1386	1835	3221	29	395	424	8832
2025	482	1250	2866	585	5182	1388	1835	3223	29	400	429	8834
2026	482	1250	2861	585	5177	1389	1835	3224	21	404	425	8826
2027	482	1250	2861	585	5177	1390	1835	3225	13	408	421	8823
2028	482	1250	2861	585	5177	1392	1835	3227	13	412	425	8829
2029	482	1250	2861	585	5177	1393	1835	3228	13	415	428	8833
2030	482	1250	2861	585	5177	1394	1835	3229	13	418	431	8837
2031	482	1250	2861	585	5177	1395	1835	3230	13	423	436	8843
2032	482	1250	2861	585	5177	1396	1835	3231	13	427	440	8848
2033	482	1250	2861	585	5177	1397	1835	3232	13	431	444	8853
2034	482	1250	2861	585	5177	1398	1835	3233	13	435	448	8858
2035	482	1250	2861	585	5177	1398	1835	3233	13	439	452	8862
2036	482	1250	2861	585	5177	1399	1835	3234	13	443	456	8867
2037	482	1250	2861	585	5177	1400	1835	3235	13	448	461	8873
2038	482	1250	2861	585	5177	1401	1835	3236	13	452	465	8878
2039	482	1250	2861	585	5177	1402	1835	3237	13	456	469	8883
2040	482	1250	2861	585	5177	1402	1835	3237	13	460	473	8887
2041	482	1250	2861	585	5177	1403	1835	3238	13	464	477	8892
2042	482	1250	2861	585	5177	1403	1835	3238	13	468	481	8896
2043	482	1250	2861	585	5177	1403	1835	3238	13	472	485	8900
2044	482	1250	2861	585	5177	1404	1835	3239	13	476	489	8905
2045	482	1250	2861	585	5177	1404	1835	3239	13	480	493	8909
2046	482	1250	2911	585	5227	1404	1835	3239	13	485	498	8964
2047	482	1250	2911	585	5227	1404	1835	3239	13	489	502	8968
2048	482	1250	2911	585	5227	1405	1835	3240	13	493	506	8973
2049	482	1250	2911	585	5227	1405	1835	3240	13	497	510	8977
2050	482	1250	2911	585	5227	1405	1835	3240	13	501	514	8981

Table H-8
Full Surplus without California Intrastate Transfers (kaf)

Date	CA Other	MWD	IID	CVWD	CA TOTAL
2002	444	1250	3240	585	5518
2003	445	1250	3240	585	5519
2004	446	1250	3240	585	5520
2005	447	1250	3240	585	5521
2006	449	1250	3240	585	5523
2007	451	1250	3240	585	5526
2008	454	1250	3240	585	5528
2009	456	1250	3240	585	5531
2010	459	1250	3240	585	5533
2011	463	1250	3240	585	5538
2012	468	1250	3240	585	5542
2013	472	1250	3240	585	5547
2014	477	1250	3240	585	5551
2015	482	1250	3240	585	5556
2016	482	1250	3240	585	5556
2017	482	1250	3240	585	5556
2018	482	1250	3240	585	5556
2019	482	1250	3240	585	5556
2020	482	1250	3240	585	5556
2021	482	1250	3240	585	5556
2022	482	1250	3240	585	5556
2023	482	1250	3240	585	5556
2024	482	1250	3240	585	5556
2025	482	1250	3240	585	5556
2026	482	1250	3240	585	5556
2027	482	1250	3240	585	5556
2028	482	1250	3240	585	5556
2029	482	1250	3240	585	5556
2030	482	1250	3240	585	5556
2031	482	1250	3240	585	5556
2032	482	1250	3240	585	5556
2033	482	1250	3240	585	5556
2034	482	1250	3240	585	5556
2035	482	1250	3240	585	5556
2036	482	1250	3240	585	5556
2037	482	1250	3240	585	5556
2038	482	1250	3240	585	5556
2039	482	1250	3240	585	5556
2040	482	1250	3240	585	5556
2041	482	1250	3240	585	5556
2042	482	1250	3240	585	5556
2043	482	1250	3240	585	5556
2044	482	1250	3240	585	5556
2045	482	1250	3240	585	5556
2046	482	1250	3240	585	5556
2047	482	1250	3240	585	5556
2048	482	1250	3240	585	5556
2049	482	1250	3240	585	5556
2050	482	1250	3240	585	5556

Table H-9
Six State Alternative Level 2 Surplus Schedules (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	1212	2959	360	4974	1332	1458	2790	26	278	304	8068
2003	444	1212	2939	354	4949	1337	1447	2784	26	278	304	8038
2004	445	1212	2902	350	4909	1342	1382	2724	27	295	322	7955
2005	447	1212	2882	356	4896	1348	1415	2763	28	283	311	7970
2006	449	1212	2811	356	4828	1353	1447	2800	28	273	301	7929
2007	452	1212	2786	361	4810	1359	1441	2800	28	275	303	7913
2008	453	1212	2761	366	4793	1364	1436	2800	29	279	308	7901
2009	456	1212	2736	371	4775	1369	1431	2800	29	283	312	7887
2010	459	1212	2711	376	4757	1375	1425	2800	29	287	316	7873
2011	464	1212	2686	381	4742	1375	1425	2800	29	291	320	7862
2012	468	1212	2681	386	4747	1376	1424	2800	29	295	324	7871
2013	473	1212	2676	391	4751	1376	1424	2800	29	299	328	7879
2014	477	1212	2671	396	4756	1377	1423	2800	29	302	331	7887
2015	482	1212	2666	401	4760	1378	1422	2800	29	303	332	7892
2016	482	1212	2661	406	4760	1378	1422	2800	29	307	336	7896

Table H-10
Six State Alternative Level 3 Surplus Schedules (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	962	2959	360	4724	1332	1458	2790	26	278	304	7818
2003	444	962	2939	354	4699	1337	1447	2784	26	278	304	7788
2004	445	962	2902	350	4659	1342	1382	2724	27	295	322	7705
2005	447	962	2882	356	4646	1348	1415	2763	28	283	311	7720
2006	449	962	2811	356	4578	1353	1447	2800	28	273	301	7679
2007	452	962	2786	361	4560	1359	1441	2800	28	274	302	7662
2008	453	962	2761	366	4543	1364	1436	2800	29	275	304	7647
2009	456	962	2736	371	4525	1369	1431	2800	29	277	306	7631
2010	459	962	2711	376	4507	1375	1425	2800	29	279	308	7615
2011	464	962	2686	381	4492	1375	1425	2800	29	281	310	7602
2012	468	962	2681	386	4497	1376	1424	2800	29	283	312	7609
2013	473	962	2676	391	4501	1376	1424	2800	29	285	314	7615
2014	477	962	2671	396	4506	1377	1423	2800	29	287	316	7622
2015	482	962	2666	401	4510	1378	1422	2800	29	287	316	7626
2016	482	962	2661	406	4510	1378	1422	2800	29	289	318	7628

Table H-11
California Plan Normal Schedules (kaf)

Year	CA Other	PVID	MWD	IID	CVWD	CA TOTAL	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	61	283	745	2959	360	4407	1332	1458	2790	26	277	303	7500
2003	63	281	774	2939	354	4412	1337	1447	2784	26	278	304	7500
2004	65	280	858	2902	350	4455	1342	1382	2724	27	294	321	7500
2005	68	279	843	2882	356	4427	1348	1415	2763	28	282	310	7500
2006	71	278	884	2811	356	4400	1353	1447	2800	28	272	300	7500
2007	75	277	902	2786	361	4400	1359	1441	2800	28	272	300	7500
2008	78	275	919	2761	366	4400	1364	1436	2800	29	271	300	7500
2009	82	274	937	2736	371	4400	1369	1431	2800	29	271	300	7500
2010	86	273	955	2711	376	4400	1375	1425	2800	29	271	300	7500
2011	92	272	970	2686	381	4400	1375	1425	2800	29	271	300	7500
2012	98	270	965	2681	386	4400	1376	1424	2800	29	271	300	7500
2013	104	269	961	2676	391	4400	1376	1424	2800	29	271	300	7500
2014	110	267	956	2671	396	4400	1377	1423	2800	29	271	300	7500
2015	116	266	952	2666	401	4400	1378	1422	2800	29	271	300	7500
2016	116	266	952	2661	406	4400	1378	1422	2800	29	271	300	7500
2017	116	266	952	2656	411	4400	1379	1421	2800	29	271	300	7500
2018	116	266	952	2651	416	4400	1380	1420	2800	29	271	300	7500
2019	116	266	952	2646	421	4400	1380	1420	2800	29	271	300	7500
2020	116	266	952	2641	426	4400	1381	1419	2800	29	271	300	7500
2021	116	266	952	2636	431	4400	1382	1418	2800	29	271	300	7500
2022	116	266	952	2631	436	4400	1383	1417	2800	29	271	300	7500
2023	116	266	952	2626	441	4400	1385	1415	2800	29	271	300	7500
2024	116	266	952	2621	446	4400	1386	1414	2800	29	271	300	7500
2025	116	266	952	2616	451	4400	1388	1412	2800	29	271	300	7500
2026	116	266	952	2611	456	4400	1389	1411	2800	21	279	300	7500
2027	116	266	952	2611	456	4400	1390	1410	2800	13	287	300	7500
2028	116	266	952	2611	456	4400	1392	1408	2800	13	287	300	7500
2029	116	266	952	2611	456	4400	1393	1407	2800	13	287	300	7500
2030	116	266	952	2611	456	4400	1394	1406	2800	13	287	300	7500
2031	116	266	952	2611	456	4400	1395	1405	2800	13	287	300	7500
2032	116	266	952	2611	456	4400	1396	1404	2800	13	287	300	7500
2033	116	266	952	2611	456	4400	1397	1403	2800	13	287	300	7500
2034	116	266	952	2611	456	4400	1398	1402	2800	13	287	300	7500
2035	116	266	952	2611	456	4400	1398	1402	2800	13	287	300	7500
2036	116	266	952	2611	456	4400	1399	1401	2800	13	287	300	7500
2037	116	266	952	2611	456	4400	1400	1400	2800	13	287	300	7500
2038	116	266	952	2611	456	4400	1401	1399	2800	13	287	300	7500
2039	116	266	952	2611	456	4400	1402	1398	2800	13	287	300	7500
2040	116	266	952	2611	456	4400	1402	1398	2800	13	287	300	7500
2041	116	266	952	2611	456	4400	1403	1397	2800	13	287	300	7500
2042	116	266	952	2611	456	4400	1403	1397	2800	13	287	300	7500
2043	116	266	952	2611	456	4400	1403	1397	2800	13	287	300	7500
2044	116	266	952	2611	456	4400	1404	1396	2800	13	287	300	7500
2045	116	266	952	2611	456	4400	1404	1396	2800	13	287	300	7500
2046	116	266	902	2661	456	4400	1404	1396	2800	13	287	300	7500
2047	116	266	902	2661	456	4400	1404	1396	2800	13	287	300	7500
2048	116	266	902	2661	456	4400	1405	1395	2800	13	287	300	7500
2049	116	266	902	2661	456	4400	1405	1395	2800	13	287	300	7500
2050	116	266	902	2661	456	4400	1405	1395	2800	13	287	300	7500

Table H-12
California Plan Surplus Schedules Level 1 (kaf)

Date	**CA Other**	PVID	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	61	383	1250	3209	585	5487	1332	1658	2990	26	312	338	8815
2003	63	381	1250	3189	585	5468	1337	1647	2984	26	314	340	8792
2004	65	380	1250	3152	585	5432	1342	1582	2924	27	316	343	8699
2005	68	379	1250	3132	585	5413	1348	1615	2963	28	316	344	8720
2006	71	378	1250	3061	585	5344	1353	1652	3005	28	321	349	8698
2007	75	377	1250	3036	585	5322	1359	1680	3039	28	326	354	8715
2008	78	375	1250	3011	585	5299	1364	1715	3079	29	330	359	8737
2009	82	374	1250	2986	585	5276	1369	1750	3119	29	334	363	8758
2010	86	373	1250	2961	585	5254	1375	1787	3162	29	338	367	8783
2011	92	372	1250	2936	585	5233	1375	1812	3187	29	342	371	8791
2012	98	370	1250	2931	585	5233	1376	1835	3211	29	345	374	8818
2013	104	369	1250	2926	585	5233	1376	1835	3211	29	349	378	8822
2014	110	367	1250	2921	585	5232	1377	1835	3212	29	353	382	8826
2015	116	366	1250	2916	585	5232	1378	1835	3213	29	357	386	8831
2016	116	366	1250	2911	585	5227	1378	1835	3213	29	361	390	8830

Table H-13
California Plan Surplus Schedules Level 2 (kaf)

Date	CA Other	PVID	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	61	383	1250	2959	360	5012	1332	1458	2790	26	277	303	8105
2003	63	381	1250	2939	354	4987	1337	1447	2784	26	278	304	8076
2004	65	380	1250	2902	350	4947	1342	1382	2724	27	294	321	7992
2005	68	379	1250	2882	356	4934	1348	1415	2763	28	282	310	8007
2006	71	378	1250	2811	356	4866	1353	1447	2800	28	272	300	7966
2007	75	377	1250	2786	361	4848	1359	1441	2800	28	272	300	7948
2008	78	375	1250	2761	366	4831	1364	1436	2800	29	271	300	7931
2009	82	374	1250	2736	371	4813	1369	1431	2800	29	271	300	7913
2010	86	373	1250	2711	376	4795	1375	1425	2800	29	271	300	7895
2011	92	372	1250	2686	381	4780	1375	1425	2800	29	271	300	7880
2012	98	370	1250	2681	386	4785	1376	1424	2800	29	271	300	7885
2013	104	369	1250	2676	391	4789	1376	1424	2800	29	271	300	7889
2014	110	367	1250	2671	396	4794	1377	1423	2800	29	271	300	7894
2015	116	366	1250	2666	401	4798	1378	1422	2800	29	271	300	7898
2016	116	366	1250	2661	406	4798	1378	1422	2800	29	271	300	7898

Table H-14

California Plan Surplus Schedules Level 3 (kaf)

Date	CA Other	PVID	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	61	283	1250	2959	360	4912	1332	1458	2790	26	277	303	8005
2003	63	281	1250	2939	354	4887	1337	1447	2784	26	278	304	7976
2004	65	280	1250	2902	350	4847	1342	1382	2724	27	294	321	7892
2005	68	279	1250	2882	356	4834	1348	1415	2763	28	282	310	7907
2006	71	278	1250	2811	356	4766	1353	1447	2800	28	272	300	7866
2007	75	277	1250	2786	361	4748	1359	1441	2800	28	272	300	7848
2008	78	275	1250	2761	366	4731	1364	1436	2800	29	271	300	7831
2009	82	274	1250	2736	371	4713	1369	1431	2800	29	271	300	7813
2010	86	273	1250	2711	376	4695	1375	1425	2800	29	271	300	7795
2011	92	272	1250	2686	381	4680	1375	1425	2800	29	271	300	7780
2012	98	270	1250	2681	386	4685	1376	1424	2800	29	271	300	7785
2013	104	269	1250	2676	391	4689	1376	1424	2800	29	271	300	7789
2014	110	267	1250	2671	396	4694	1377	1423	2800	29	271	300	7794
2015	116	266	1250	2666	401	4698	1378	1422	2800	29	271	300	7798
2016	116	266	1250	2661	406	4698	1378	1422	2800	29	271	300	7798

Table H-15

Basin States Plan Surplus Schedules Level 1 (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	1250	3130	489	5312	1332	1658	2990	26	312	338	8640
2003	445	1250	3110	483	5287	1337	1647	2984	26	314	340	8611
2004	446	1250	3073	478	5247	1342	1582	2924	27	316	343	8514
2005	447	1250	3053	485	5234	1348	1615	2963	28	316	344	8541
2006	449	1250	2982	485	5166	1353	1652	3005	28	321	349	8520
2007	451	1250	2957	490	5148	1359	1680	3039	28	326	354	8541
2008	454	1250	2932	495	5131	1364	1715	3079	29	330	359	8569
2009	456	1250	2907	500	5113	1369	1750	3119	29	334	363	8595
2010	459	1250	2882	505	5095	1375	1787	3162	29	338	367	8624
2011	463	1250	2857	510	5080	1375	1812	3187	29	342	371	8638
2012	468	1250	2852	515	5085	1376	1835	3211	29	345	374	8670
2013	472	1250	2947	520	5089	1376	1835	3211	29	349	378	8678
2014	477	1250	2842	525	5094	1377	1835	3212	29	353	382	8688
2015	482	1250	2937	530	5098	1378	1835	3213	29	357	386	8697
2016	482	1250	2832	535	5098	1378	1835	3213	29	361	390	8701

Table H-16
Basin States Plan Surplus Schedules Level 2 (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	1250	2959	360	5012	1332	1458	2790	26	278	304	8106
2003	444	1250	2939	354	4987	1337	1447	2784	26	278	304	8076
2004	445	1250	2902	350	4947	1342	1382	2724	27	295	322	7993
2005	447	1250	2882	356	4934	1348	1415	2763	28	283	311	8008
2006	449	1250	2811	356	4866	1353	1447	2800	28	273	301	7967
2007	452	1250	2786	361	4848	1359	1441	2800	28	275	303	7951
2008	453	1250	2761	366	4831	1364	1436	2800	29	279	308	7939
2009	456	1250	2736	371	4813	1369	1431	2800	29	283	312	7925
2010	459	1250	2711	376	4795	1375	1425	2800	29	287	316	7911
2011	464	1250	2686	381	4780	1375	1425	2800	29	291	320	7900
2012	468	1250	2681	386	4785	1376	1424	2800	29	295	324	7909
2013	473	1250	2676	391	4789	1376	1424	2800	29	299	328	7917
2014	477	1250	2671	396	4794	1377	1423	2800	29	302	331	7925
2015	482	1250	2666	401	4798	1378	1422	2800	29	303	332	7930
2016	482	1250	2661	406	4798	1378	1422	2800	29	307	336	7934

Table H-17
Basin States Plan Surplus Schedules Level 3 (kaf)

Date	CA Other	MWD	IID	CVWD	CA Total	AZ Other	CAP	AZ Total	NV Other	SNWP	NV Total	Total LB
2002	444	832	2959	360	4594	1332	1458	2790	26	278	304	7688
2003	444	852	2939	354	4589	1337	1447	2784	26	278	304	7678
2004	445	872	2902	350	4569	1342	1382	2724	27	295	322	7615
2005	447	892	2882	356	4576	1348	1415	2763	28	283	311	7650
2006	449	912	2811	356	4528	1353	1447	2800	28	273	301	7629
2007	452	932	2786	361	4530	1359	1441	2800	28	274	302	7632
2008	453	952	2761	366	4533	1364	1436	2800	29	275	304	7637
2009	456	972	2736	371	4535	1369	1431	2800	29	277	306	7641
2010	459	992	2711	376	4537	1375	1425	2800	29	279	308	7645
2011	464	1012	2686	381	4542	1375	1425	2800	29	281	310	7652
2012	468	1032	2681	386	4567	1376	1424	2800	29	283	312	7679
2013	473	1052	2676	391	4591	1376	1424	2800	29	285	314	7705
2014	477	1072	2671	396	4616	1377	1423	2800	29	287	316	7732
2015	482	1092	2666	401	4640	1378	1422	2800	29	287	316	7756
2016	482	1112	2661	406	4660	1378	1422	2800	29	289	318	7778

ATTACHMENT I

Draft Interim Surplus Guidelines

This attachment contains draft guidelines to provide reviewers with an understanding of the proposed format and content of the proposed interim surplus criteria.

It should be noted that the surplus depletion schedules shown in these guidelines are estimated and are intended to provide an approximation of the amounts of surplus water that would be provided at the various elevations of Lake Mead.

Draft
Colorado River Interim Surplus Guidelines
for
Basin States Alternative

1 INTRODUCTION

The Secretary of the Interior, acting through the U.S. Bureau of Reclamation, is implementing these specific interim guidelines under which surplus water conditions would be determined in the Colorado River Basin.

The long-term management objectives of the Colorado River system require the Secretary to:

- Minimize flood damages from river flows,
- Release water only in accordance with the 1964 Decree in Arizona v. California (Decree),
- Protect and enhance the environmental resources of the basin,
- Provide reliable delivery of water for beneficial consumptive use,
- Increase flexibility of water deliveries under a complex allocation system,
- Encourage efficient use of renewable water supplies,
- Minimize curtailment to users who depend on such water supplies, and
- Consider power generation needs.

On an annual basis, the Secretary has applied factors, including but not limited to those found in Article III(3) (b) (i-iv) of the LROC, in annual determinations of the availability of surplus quantities for pumping or release from Lake Mead. As a result of actual operating experience through preparation of annual plans of operation, particularly during recent years when there has been increasing demand for surplus water, the Secretary has determined that there is a need for more specific surplus criteria, consistent with the Decree and applicable Federal law, to assist in the Secretary's annual decision making during an interim period.

Additionally, through adoption of specific interim surplus criteria, the Secretary will afford mainstream users of Colorado River water, particularly those in California who currently utilize surplus flows, a greater degree of predictability with respect to the likely existence, or lack thereof, of surplus conditions on the river in a given year. Adoption of the interim surplus criteria is intended to recognize California's plan to reduce reliance on surplus deliveries, to assist California in moving towards its allocated share of Colorado River water, and to avoid hindering such efforts. Implementation of interim surplus criteria would take into account progress, or lack

thereof, in California's efforts to achieve these objectives. The surplus criteria identify the estimated specific amount of surplus water to be made available in a given year, based upon factors such as the elevation of Lake Mead. The increased level of predictability with respect to the prospective existence and quantity of surplus water, will assist in the planning and operations by all entities that receive surplus Colorado River water pursuant to contracts with the Secretary.

2 BACKGROUND

2.1 LONG RANGE OPERATING CRITERIA

The Long Range Operating Criteria (LROC) provides that the Secretary will determine the extent to which the reasonable beneficial consumptive use requirements of mainstream users in the Lower Division can be met. Pursuant to Article II(B)2 of the Decree, if there exists sufficient water available in a single year for pumping or release from Lake Mead to satisfy annual consumptive use in the states of California, Nevada, and Arizona in excess of 7.5 maf, such water may be determined by the Secretary to be made available as "surplus" water. The Secretary is authorized to determine the conditions upon which such water may be made available. The Colorado River Basin Project Act directed the Secretary to adopt criteria for coordinated long-range operation of reservoirs on the Colorado River in order to comply with and carry out the provisions of the Colorado River Compact, the Boulder Canyon Project Act, the Colorado River Storage Project Act and the U.S.-Mexico Water Treaty.

These Guidelines serve to implement Section III (3) of the LROC. The guidelines do not apply to determinations of surplus to the United Mexican States (Mexico) pursuant to the United States-Mexico Water Treaty of 1944.

2.2 ANNUAL OPERATING PLAN

The Secretary prepares, on an annual basis, an Annual Operating Plan (AOP) describing the projected operation of the Colorado River reservoirs for the current year. The AOP is prepared in consultation with the seven Basin States Governors' representatives; the Upper Colorado River Commission; appropriate Federal agencies; representatives of the academic and scientific communities, environmental organizations, and the recreation industry; water delivery contractors; contractors for the purchase of Federal power; others interested in Colorado River operations; and the general public, through the Colorado River Management Work Group. The AOP describes actual operations under the LROC, as required by the CRBPA.

2.3 ENVIRONMENTAL CONSULTATION AND DOCUMENTATION

Environmental analyses have been conducted for this proposal pursuant to the National Environmental Protection Act (NEPA) and the Endangered Species Act (ESA) involving the following consultation and documentation:

- DEIS published in July 2000
- ESA consultation with U.S. Fish and Wildlife Service and National Marine Fisheries Service
- Consultation with Tribes
- Consultation with Mexico pursuant to international agreement
- Final EIS published in December 2000

3 CONDITIONS OF IMPLEMENTATION

3.1 EFFECTIVE DATES

These guidelines will be in effect 30 days from publication of the Secretary's Record of Decision (ROD) in the Federal Register. The guidelines will, unless subsequently modified, remain effective through December 31, 2016. After the interim period, the surplus criteria will revert to the "no action" conditions (i.e., determinations will be made on an annual basis through the AOP process.)

3.2 ALLOCATION OF SURPLUS WATER

The interim surplus criteria set forth in Section 4 identify the circumstances for the Secretary's annual determination of the availability of surplus water. These criteria do not address the allocation of surplus water. Surplus water will continue to be allocated for use among the Lower Division States in a manner consistent with the percentages identified in the Decree. While these criteria will not specifically address the allocation of surplus within a State or among the Lower Basin States, the Secretary recognizes that the Lower Division States and individual contractors for Colorado River water are considering arrangements that may affect the utilization of surplus water during the period identified in Section 3.1. It is expected that water orders from Colorado River contractors will be submitted to reflect forbearance arrangements made by Lower Division states and individual contractors. The Secretary will deliver water to contractors in a manner consistent with these arrangements, to the extent that the water orders from contractors reflect these arrangements. Surplus water will only be delivered to entities with contracts for surplus water.

3.3 MODELING AND DATA

The August 24-Month Study projections for the January 1 system storage and reservoir water surface elevations will be used to determine the applicability of interim surplus guidelines.

In preparation of the AOP, Reclamation will utilize the 24-Month Study and/or other modeling methodologies appropriate for the determinations and findings necessary in

the AOP. Reclamation will utilize the best available data and information, including the National Weather Service forecasting to make these determinations.

3.4 California's Colorado River Water Use Plan Implementation Progress

The Secretary will annually review the status of implementation of the California Colorado River Water Use Plan during the development of the AOP. California will need to reduce its need for surplus Colorado River water by the following amounts by the dates indicated:

Date	Amount (acre-feet)
January 1, 2006	280,000
January 1, 2011	380,000

In the event that California has not reduced its use by the above quantities, the interim surplus determinations will be based upon the 70R Strategy, for either the remainder of the period identified in Section 3.1 or until such time as California complies with the reductions identified in Section 3.1.

3.5 Unused Apportionments

Nothing in these guidelines precludes the Secretary from making unused normal or surplus apportionments of Colorado River water available to another State pursuant to Article II(B)6 of the Decree.

3.6 Periodic Review

These guidelines for interim surplus criteria serve to implement Article III(3) of the LROC and will be reviewed concurrently with the LROC 5-year review. The Secretary will base annual determination of surplus conditions on these criteria, unless extraordinary circumstances arise. Such circumstances could include operations necessary for safety of dams or other emergency situations, or other activities arising from actual operating experience.

4 GUIDELINES

The following guidelines will be used, together with other appropriate considerations as required in the Colorado River Basin Project Act, the LROC and the Decree to guide the determination of the availability of surplus water for use within the Lower Division States. The following sections describe the Lake Mead water surface elevations at which various specified amounts of surplus water would be made available for use within the Lower Division states. The Secretary expects to make the specified quantities of water identified in Sections 4.1 through 4.5 available as surplus during the

15-year period. The precise amounts of annual surplus quantities will continue to be reviewed on an annual basis during the preparation of the AOP, as required by applicable federal law. The review will use the methodology for the Basin States Alternative set forth in Chapter 2 of the FEIS, actual operating experience, and updated information on the demand for Colorado River water by Lower Division contractors.

4.1 Lake Mead Below Elevation 1125 Feet

If the projected January 1 Lake Mead elevation is below 1125 feet msl, the annual pumping and release from Lake Mead will be sufficient to satisfy up to 7.5 MAF of annual consumptive use in accordance with the Decree.

4.2 Lake Mead At or Above Elevation 1125 Feet

If the projected January 1 Lake Mead elevation is at or above 1125 feet msl and below 1145 feet msl, surplus water would be made available. The estimated annual amounts of surplus water available for pumping and release from Lake Mead (in addition to the 7.5 maf normal apportionment) are listed in the following schedule:

Year	Amount Available (kaf)
2002	200
2003	200
2004	150
2005	150
2006	150
2007	150
2008	150
2009	150
2010	150
2011	200
2012	200
2013	250
2014	250
2015	300
2016	300

4.3 Lake Mead At or Above Elevation 1145 Feet

If the projected January 1 Lake Mead elevation is at or above 1145 ft. msl but below the spill avoidance strategy assuming the runoff value of the 70th percentile of exceedance based on the historic record of runoff above Lake Powell, surplus water would be made available. The annual amounts of surplus water available for pumping and release from

Lake Mead (in addition to the 7.5 maf normal apportionment) are listed in the following schedule:

Year	Amount Available (kaf)
2002	650
2003	600
2004	550
2005	550
2006	500
2007	500
2008	450
2009	450
2010	450
2011	450
2012	450
2013	450
2014	450
2015	450
2016	450

4.4 70R STRATEGY

If the projected January 1 Lake Mead storage provides insufficient space for the coming year (based on the 70R Strategy), and is below the flood control release criteria listed below, the Secretary would determine annually the quantity of surplus water available. The quantity is determined by assuming the 70th percentile historical runoff, along with normal 7.5 maf delivery to Lower Division states, for the next year. Applying these values to current reservoir storage, the projected reservoir storage at the end of the next year is calculated. The surplus is determined if the estimated space available at the end of the next year is less than the space needed by flood control criteria. The quantity of the surplus is the difference between the space required and the estimated available space. The above methodology would require calculation of the annual quantity each year during the period identified in Section 3.1. The estimated annual amounts of surplus water available for pumping and release from Lake Mead (in addition to the 7.5 maf normal apportionment) are listed in the following schedule:

Year	Amount Available (kaf)
2002	1150
2003	1150
2004	1050
2005	1050
2006	1050
2007	1050
2008	1100
2009	1100
2010	1150
2011	1150
2012	1200
2013	1200
2014	1200
2015	1200
2016	1200

4.5 FLOOD CONTROL SURPLUS

If the projected January 1 system contents projects Hoover Dam flood control releases based on the 1984 Hoover Dam, Lake Mead, Water Control Manual, the annual pumping and release from Lake Mead will be sufficient to satisfy all reasonable and beneficial consumptive uses in the Lower Basin with valid surplus contracts with the Secretary of the Interior. The estimated annual amounts of surplus water available for pumping and release from Lake Mead (in addition to the 7.5 maf normal apportionment) are listed in the following schedule:

Year	Amount Available (kaf)
2002	1350
2003	1350
2004	1350
2005	1350
2006	1400
2007	1450
2008	1500
2009	1550
2010	1600
2011	1600
2012	1650
2013	1650
2014	1650
2015	1700
2016	1700

ATTACHMENT J

Detailed Modeling Documentation

The river system operation analysis for this FEIS was conducted with Reclamation's Colorado River Simulation System model implemented in the RiverWare modeling system. This attachment contains detailed documentation of the modeling process.

Detailed Modeling Documentation

This attachment describes the reservoir operating rules and related data used in Reclamation's Colorado River Simulation System, as implemented in the RiverWare modeling system.

BACKGROUND

Long-term policy and planning studies on the Colorado River have typically used model results from the Colorado River Simulation System (CRSS), a Fortran-based modeling system, developed in the 1980's. CRSS originally ran on a Cyber mainframe computer, but was ported to run on both personal computers and Unix Workstations in 1994. CRSS modeled twelve major reservoirs and some 115 diversion points throughout the Upper and Lower basins on a monthly time step. A major drawback of CRSS was that the operating policies or rules were "hardwired" into the modeling code, making modification of those policies difficult.

Based on the need to initiate surplus and shortage studies for the Lower Basin in the early 1990's, Reclamation developed an annual time step model, CRSSez (BOR, 1998). CRSSez primarily models the operation of Lakes Powell and Mead, representing the reservoirs above Powell as one aggregate reservoir, and the effect of reservoirs below Mead as part of the water demand necessary from Mead. CRSSez was used in the Interim Surplus Criteria EIS process to facilitate the development of possible alternatives to be analyzed.

Also in 1994, Reclamation began a collaborative research and development program with the University of Colorado and the Tennessee Valley Authority with the goal of developing a general-purpose modeling tool that could be used for both operations and planning on any river basin. This modeling tool, known as RiverWare, is now being used by the Upper and Lower Colorado Regions for both planning and monthly operations (Fulp, 1999). A major advantage of RiverWare is that the operational policies or rules are no longer "hardwired" into the modeling code (Zagona, et al, 1999). The user expresses and prioritizes the rules through the RiverWare graphical user interface, and RiverWare then interprets the rules when the model is run. Multiple rule sets can be run with the same model and this provides the capability for efficient "what-if" analysis with respect to different policies.

Reclamation replaced the original CRSS model with a new model implemented in RiverWare in 1996. The new model has the same spatial and temporal resolution, uses the same basic input data (hydrology and consumptive use schedules), and uses the same physical process algorithms as the original CRSS. A rule set was also developed to mimic the policies contained in the original model. Comparison runs were made between the original CRSS and the new model and rule set, with typical differences of less than 0.5% (BOR, 1996).

The second phase of the program to replace CRSS consists of examining the rules extracted from CRSS and developing new rule sets that reflect current operational policy as well as to investigate and improve, where necessary, the physical process methodologies. A team of Reclamation engineers from the Upper and Lower Colorado Regions has been established for these purposes and this phase is on going.

DESCRIPTION OF THE MODEL

As previously mentioned, the features represented in the model are identical to the original CRSS model. In summary, twelve reservoirs are modeled (Fontenelle, Flaming Gorge, Taylor Park, Blue Mesa, Morrow Point, Crystal, Navajo, Starvation, Powell, Mead, Mohave, Havasu) and approximately 115 diversions are modeled (demands and return flows) throughout the basin. The Lower and Upper Basin diversion and depletion schedules used in this EIS are documented in Section 3.4.5 and Attachments G and J respectively. The hydrologic "natural" inflows (flows corrected for upstream regulation and consumptive uses and losses) at 29 inflow points throughout the basin were also used from the standard CRSS hydrology data set covering the period 1906-1990.

For the analysis conducted for this EIS, only the operation of Lake Powell was updated to reflect current operational policy in the Upper Basin. Operation of the other reservoirs in the Upper Basin essentially followed the operation in the original CRSS. Operation of Lakes Mead, Mohave, and Havasu also followed that of the original CRSS, with the exception of the surplus and shortage rules as described below.

RESERVOIRS ABOVE LAKE POWELL

The reservoirs above Lake Powell are operated to meet monthly storage targets (or “rule curves”) and downstream demands. The basic procedure is that given the inflow for the current month, the release will be either the release necessary to meet the target storage or the release necessary to meet demands downstream of the reservoir, whichever is greater. The rule curves are input for each reservoir, but are modified during the run for Flaming Gorge, Blue Mesa, and Navajo to simulate operations based on the imperfect inflow forecasts that are encountered in actual reservoir operations. Furthermore, each reservoir is constrained to operate within user-supplied minimum and maximum releases (mean monthly release in cfs) as specified in the following table:

Reservoir	Min Release	Max Release
Fontenelle	500	18700
Flaming Gorge	800	4900
Starvation	100	5000
Taylor Park	50	5000
Blue Mesa	270	5000
Morrow Point	300	5000
Crystal	300	4200
Navajo	300	5900

For Flaming Gorge, Blue Mesa, and Navajo, the target storage is computed by using an inflow forecast for the spring runoff season (January through July), again to mimic the imperfect forecasts seen in actual operations. The forecasted inflow (for the current month through July) is computed as a weighted average of the long-term average natural inflow and the natural inflow assumed for the year being modeled. The weights used are:

Month	Natural Inflow Weight	Average Natural Inflow weight
January	0.3	0.7
February	0.4	0.6
March	0.5	0.5
April	0.7	0.3
May	0.7	0.3
June	0.7	0.3
July	0.6	0.4

The long-term, average natural inflows into each reservoir are (1000 af):

Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul
Flaming Gorge	23.3	20.9	33.8	87.9	250.4	327.8	157.5
Blue Mesa	34.0	39.5	94.6	176.0	339.8	561.6	346.8
Navajo	18.8	24.6	69.3	176.9	297.3	284.7	120.1

Based on the inflow forecast, the rule computes the volume necessary to release from the current month through July, assuming the reservoir will fill in July:

> Release needed for the current month = (current contents - live capacity + predicted remaining inflow) divided by the number of months remaining until the end of July

The target storage for the current month is then computed, adjusting for any gains or losses above the reservoir:

Target storage = previous storage - release needed + gains - losses

LAKE POWELL OPERATION

As previously stated, the operation of Lake Powell was modified to reflect current operating polices. In the original CRSS rules, Lake Powell was operated on a rule curve that was *not* adjusted for an inflow forecast. Two other higher priority rules ensured that the minimum objective release of 8.23 million afy was met and that equalization of Lakes Powell and Mead was accomplished when necessary.

The rule curve operation of Lake Powell was replaced by a new rule that better represents current operational practices. This new rule consists of a forecast-driven, spring runoff operation (January through July) that attempts to fill the reservoir to a July target storage and a fall operation (August through December) that attempts to draw down the reservoir to a December target storage. For this EIS, the July and December targets were 23.822 maf (500 kaf of space) and 21.900 maf (2.422 kaf of space) respectively. In addition, a rule was added to simulate the occurrence of Beach Habitat Building Flows (BHBF's or "spike" flows). The minimum objective release and equalization rules were kept essentially the same as in the original CRSS rules. Release constraints that reflect the 1996 Record of Decision on the Operation of Glen Canyon Dam were also added to the Lake Powell rule set.

LAKE POWELL INFLOW FORECAST

Since the original CRSS rules computed an inflow forecast for Lake Powell and adjusted it for use by the flood control operation at Lake Mead, the same forecasting algorithm could be applied to the new operation of Lake Powell. The unregulated Lake Powell inflow forecast from the current month through July is computed as:

natural flow into Lake Powell - estimated Upper Basin depletions + the forecast error

where the forecast error is computed using equations derived from an analysis of past Colorado River forecasts and runoff data for the period 1947 to 1983.

As detailed in the original CRSS overview document (BOR, 1985), analysis of these data revealed two strongly established patterns: (1) high runoff years are under-forecast, and low runoff years are over-forecast; (2) the error in the current month's seasonal forecast is strongly correlated with the error in the preceding month's forecast. A regression model was developed to aid in determining the error to be incorporated into the seasonal forecast for each month from January to June. The error is the sum of a deterministic and a random component. The deterministic component is computed from the regression equation. The random component is computed by multiplying the standard error of the regression

equation by a random mean deviation selected from a standard normal distribution. The forecast error equation has the following form (all runoff units are maf):

$$E_i = a_i X_i + b_i E_{(i-1)} + C_i + Z_r d_i$$

where:

- i = month
- E_i = error in the forecast for month "i."
- X_i = natural runoff into Lake Powell from month "i" through July.
- a_i = linear regression coefficient for X_i.
- $E_{(i-1)}$ = previous month's forecast error
- b_i = linear regression coefficient for $E_{(i-1)}$.
- c_i = constant term in regression equation for month "i."
- Z_r = randomly determined deviation
- d_i = standard error of estimate for regression equation for month "i."

The following table summarizes the regression equation coefficients for each month:

Month	a_i	b_i	c_i	d_i
January	0.70	0.00	-8.195	1.270
February	0.00	0.80	-0.278	0.977
March	0.00	0.90	0.237	0.794
April	0.00	0.76	0.027	0.631
May	0.00	0.85	0.132	0.377
June	0.24	0.79	0.150	0.460

The magnitude of the June forecast error is constrained to not exceed 50 percent of the May forecast error and the July forecast error is equal to 25 percent of the June forecast error.

SPRING RUNOFF OPERATION (JANUARY THROUGH JULY)

To accomplish the spring operation, the unregulated forecast is first adjusted to account for potential reservoir regulation above Powell. This potential regulation is currently computed as just the sum of the available space (live capacity – previous month's storage) in Fontenelle, Flaming Gorge, Blue Mesa, and Navajo. Using the regulated forecasted inflow, the total volume of water necessary to release from the current month through July is computed as:

total volume to release = previous storage – July target storage
+ forecasted regulated inflow – loss due to evaporation
– loss due to bank storage
–

The release for the current month is then computed by multiplying the total volume to release by a fraction for the current month, where the fraction reflects a user-supplied preferred weighting pattern. The weights and resulting fractions used for this study are as follows:

Spring Season	Weights	Fractions
January	0.170	0.170
February	0.160	0.193
March	0.130	0.194
April	0.100	0.185
May	0.100	0.227
June	0.160	0.471
July	0.180	1.000

The fraction is computed as current month's weight divided by the sum of the current and remaining month's weights for the season.

During the spring operation, however, the computed release is constrained to be at least as great as the total volume divided by the number of months remaining. This constraint ensures that sufficient water is released early in the season during high forecast years. Lake Powell's spring operational release is further constrained in each month to be within a minimum and maximum range (currently set to 6500 and 25000 cfs respectively).

FALL OPERATION (AUGUST THROUGH DECEMBER)

Conceptually, the computation for the fall operation is identical to that done for the spring operation. The regulated inflow forecast is simply the natural inflow, adjusted for Upper Basin depletions, and potential reservoir regulation with no forecast error added. The potential reservoir regulation is again computed as the sum of the available space in Fontenelle, Flaming Gorge, Blue Mesa, and Navajo, where the space is the target storage in December for each reservoir minus the previous month's storage. User-supplied weights are also used to compute the current month release from the total volume to release in the fall. The weights and resulting fractions are as follows:

Fall Season	Weights	Fractions
August	0.266	0.266
September	0.200	0.272
October	0.156	0.292
November	0.156	0.413
December	0.222	1.000

Two additional constraints are placed on the computed monthly release to ensure a smooth operation. In July, the release is constrained to be at least 1.0 maf if Powell's storage is greater than 23.0 maf. From July through December, the release is constrained to not exceed 1.5 maf, as long as a 1.5 maf release results in a storage at Lake Powell less than 23.822 maf. Powell's fall operational release is further constrained in each month to be within a minimum and maximum range (currently set to 6500 and 25000 cfs respectively).

MINIMUM OBJECTIVE RELEASE

A higher priority rule ensures that the previously described Powell operation will satisfy a minimum objective release to the Lower Basin, currently equal to 8.23 maf over each water year (October through September). Similar to the weighting and release fraction scheme used for the operational rule, a preferred release pattern for each month to meet the minimum objective release is supplied and a fraction is computed. The release pattern (in kaf) and resulting fractions are as follows:

Month	Release	Fraction
October	600	0.073
November	600	0.079
December	700	0.100
January	800	0.126
February	700	0.127
March	600	0.124
April	600	0.142
May	600	0.165
June	700	0.231
July	800	0.343
August	900	0.588
September	630	1.000

The fraction is computed as current month's release divided by the sum of the current and remaining month's releases through September.

Each month the rule computes the volume of water remaining to meet the minimum objective release for the current water year (accounting for the water released previously in

the water year) and multiplies that volume by the release fraction. The release determined by the operational rule must then be at least as great as this resulting minimum objective release for the month.

EQUALIZATION OF LAKES POWELL AND MEAD

The equalization of storage between Lakes Powell and Mead is implemented in a rule that first determines if equalization needs to occur, and if so, then determines how much water to release from Powell to accomplish it. The rule is in effect from January through September of each year. The rule states that equalization needs to occur if two criteria are met: (1) if the storage in the Upper Basin meets the 602(a) requirement, and (2), if the projected end-of-water-year (EOWY) storage in Lake Powell is greater than that in Lake Mead.

The storage in the Upper Basin is computed for each month (January through September) and consists of the predicted EOWY storage in Lake Powell, plus the sum of the previous month's storage for Flaming Gorge, Blue Mesa, and Navajo. That storage is then compared to the computed value of 602(a) storage, described below to see if the 602(a) requirement is met each month. The method of estimating the EOWY storage is described below.

The release for equalization is computed by taking half of the difference between the predicted EOWY contents of Lake Powell and Lake Mead and dividing by the number of months remaining through September. Evaporation and bank storage losses at Lakes Powell and Mead are included in the calculation, resulting in an iterative procedure to arrive at the computed equalization release. The iteration stops when the forecasted EOWY contents of Lake Powell and Lake Mead are within a user-specified tolerance. That tolerance is currently set to 25000 acre-feet.

The computed equalization release for each month is constrained in three ways. If the additional release due to equalization would cause the total Upper Basin storage to drop below the 602(a) requirement, then the amount of the equalization release is reduced to prevent this from happening. Likewise, the equalization release is reduced if it would cause Lake Mead contents to exceed its exclusive flood control space. Finally, the equalization release is constrained to be less than or equal to the maximum power plant capacity at Lake Powell (currently set to 33,100 cfs).

602(a) STORAGE REQUIREMENT

As stated in the CRSS overview document (BOR, 1985), "602(a) storage refers to the quantity of water required to be in storage in the Upper Basin so as to assure future deliveries to the Lower Basin without impairing annual consumptive uses in the Upper Basin". The current implementation of that storage requirement duplicates the original CRSS calculation. It computes the storage necessary in the Upper Basin to meet the minimum objective release and Upper Basin depletions over the next "n" years, assuming the inflow over that period would follow that seen in the most "critical period on record".

The critical period in the Colorado River basin occurred in 1953-1964, a length of 12 years. Inflows from these years are used in the calculation of 602(a) storage.

At the beginning of each calendar year, a value for 602(a) storage is computed by the following formula:

602a = {(UBDepletion + UBEvap)* (1 - percentShort/ 100) + minObjRel
- criticalPeriodInflow} * 12 + minPowerPoolStorage

where:

602a = the 602(a) storage requirement

UBDepletion = the average over the next 12 years of the Upper Basin scheduled depletions

UBEvap = the average annual evaporation loss in the Upper Basin (currently set to 560 kaf)

percentShort = the percent shortage that will be applied to Upper Basin depletions during the critical period (currently set to zero)

minObjRel = the minimum objective release to the Lower Basin (currently set to 8.23 maf)

criticalPeriodInflow = average annual natural inflow into the Upper Basin during the critical period (1953-1964) (currently set to 12.18 maf)

minPowerPoolStorage = the amount of minimum power pool to be preserved in Upper Basin reservoirs (currently set to 5.179 maf)

All parameter values currently used were as found in the original CRSS data files ported from the Cyber mainframe in 1994.

PREDICTING END-OF-WATER-YEAR (EOWY) CONTENTS OF LAKES POWELL AND MEAD

Lake Powell EOWY content is predicted each month by taking the previous month's storage, adding the estimated inflow, subtracting the estimated release, and subtracting the estimate of evaporation and change in bank storage. All estimated values are for the period from the current month through September. The estimated inflow is just the regulated inflow forecast previously discussed, where the forecast error is included through July. The estimated release is based on the spring operation (through July) and the fall operation for August and September. The estimated evaporation and bank storage losses are based on an initial estimate of the EOWY content.

Similarly, the Lake Mead EOWY content is predicted each month by taking the previous month's content, adding the estimated Powell release, subtracting the estimated Mead release, adding the average gain between Powell and Mead, subtracting the Southern Nevada depletion, and subtracting the estimate of evaporation and change in bank storage. Again, all values are for the period from the current month through September. Lake Mead's release is estimated as the sum of the depletions downstream of Mead and the reservoir regulation requirements (including evaporation losses) for Lakes Mohave and Havasu minus the gains below Mead.

BEACH /HABITAT BUILDING FLOWS (BHBF'S)

Under the current rule that implements BHBF's, a BHBF is triggered for the current month if the following conditions are met:

- in January, if the unregulated inflow forecast for January through July (the natural flow – Upper Basin depletions plus forecast error) is greater than the "January trigger volume" (currently set to 13.0 maf)
- in January through July, if the current month's Powell release is greater than the "release trigger" (currently set to 1.5 maf) *or* if the release volume for the current month through July equally distributed over those months would result in a release greater than the "release trigger"

Once a BHBF has been triggered, if Powell would have had to spill in that month anyway, the total outflow from Powell is not increased; rather the volume for the BHBF (currently set to 200 kaf) is taken from the total outflow already determined by the operational rule. If Powell was not going to spill in that month, then the total outflow from Powell is increased (i.e., the volume for the BHBF is taken from Powell's storage). Under the case where the BHBF is triggered even though the current month's release is less than the "release trigger", the rule re-sets Powell's outflow for that month to the trigger release amount (1.5 maf).

Under all circumstances, only one BHBF is made per calendar year.

LAKE MEAD OPERATION

Lake Mead is operated primarily to meet downstream demand, including downstream depletions (both U.S. and Mexico) and reservoir regulation requirements. In any month, the rule computes the downstream depletions based on schedules that have been set as input data or by other rules (for the case of surplus or shortage in the Lower Basin). The reservoir regulation requirements for Lakes Mohave and Havasu include water necessary to meet their storage targets and evaporation losses for each month. The operation rule computes the release necessary from Lake Mead to meet that total downstream demand minus gains below Mead. This release may be increased, however, based on flood control procedures.

MEAD FLOOD CONTROL

There are three flood control procedures currently in effect for different times of the year. These procedures were developed in the original CRSS and were based on the Field Working Agreement between Reclamation and the Army Corps of Engineers (ACOE, 1982). The first procedure is in effect throughout the year. Its objective is to maintain a minimum space of 1.5 maf in Lake Mead, primarily for extreme rain events. This space is referred to as the exclusive flood control space and is represented by the space above elevation 1219.61. The second procedure is used during the spring runoff forecast season (January through July). The objective during this period is to route the maximum forecasted inflow through the reservoir system using specific rates of Hoover Dam discharge, assuming that the lake will fill (to elevation 1219.61) at the end of July. The

third procedure is used during the space building or drawdown period (August through December). The objective during this period is to gradually draw down the reservoir system to meet the total system space requirements in each month in anticipation of the next year's runoff.

EXCLUSIVE FLOOD CONTROL SPACE REQUIREMENT

As previously noted, this requirement states that space in Lake Mead must be a minimum of 1.5 maf at all times. If the release computed to meet downstream demand results in a Lake Mead storage that would violate this space requirement, the rule computes the additional release necessary to maintain that space.

SPRING RUNOFF SEASON (JANUARY THROUGH JULY)

The flood control policy requires that the maximum forecast be used where that forecast is defined as the estimated inflow volume that, on average, will not be exceeded 19 times out of 20 (a 95% non-exceedance). The rule first computes the inflow forecast to Lake Mead by taking the Lake Powell forecast previously described and adds the long-term, average natural tributary inflows between Lakes Powell and Mead. The maximum forecast is then estimated by adding an additional volume (the "forecast error term") to that inflow forecast. The forecast error term is given in the following table, taken from the original CRSS data:

Forecast Period	Forecast Error Term (maf)
January – July	4.980
February – July	4.260
March – July	3.600
April – July	2.970
May – July	2.525
June – July	2.130
July - July	0.750

The Field Working Agreement defines an iterative algorithm by which the current month's release is determined. Certain release levels are specified and are given in the following table:

Release Level	Release (cfs)	Description
1	19000	Parker powerplant capacity
2	28000	Davis powerplant capacity
3	35000	Hoover powerplant capacity (in 1987)
4	40000	Approx. max. flow non-damaging to streambed
5	73000	Hoover controlled discharge capacity

The flood control release needed for the current month is determined by:

> release needed for the current month = maximum forecasted inflow - current storage space in Lake Powell (below 3700 feet) – current storage space in Lake Mead (below 1229 feet) + 1.5 maf (exclusive space) - evaporation and bank storage losses from Lakes Powell and Mead - Southern Nevada depletion – future volume of water released (assuming a release level from the table for the remaining months through July)

If the computed release for the current month is greater than that assumed for the future months, the future level is increased and the current month release is re-computed. The computation stops once the computed release for the current month is less than or equal to that assumed for the future months. If the computed release is greater than the previously assumed level, that release is used for the current month; otherwise, the previously assumed level is used.

The rule sets Lake Mead's release to the flood control release if it is greater than the release previously computed to meet downstream demands.

SPACE BUILDING (AUGUST THROUGH DECEMBER)

The flood control policy states the flood control storage space in Lake Mead (storage below elevation 1229 feet) required at the beginning of each month from August through January:

Date	Space Required (maf)
August	1.50
September	2.27
October	3.04
November	3.81
December	4.58
January	5.35

However, these targets may be reduced to the minimum of 1.5 maf in each month if additional space is available upstream in active storage. Certain upstream reservoirs are specified with a maximum creditable space for each:

Reservoir	Max. Creditable Storage Space (maf)
Powell	3.8500
Navajo	1.0359
Blue Mesa	0.7485
Flaming Gorge plus Fontenelle	1.5072

In each month (July through December), if the release computed to meet downstream demands results in an end-of-month Lake Mead storage that would violate the space requirement adjusted for upstream storage, the rule computes the additional release necessary to maintain that space. However, these releases are constrained to be less than or equal to 28,000 cfs.

LAKE MOHAVE AND LAKE HAVASU OPERATION

Lakes Mohave and Havasu are operated to meet a user-specified target storage at the end of each month. These storage targets are given in the following table:

Month	Mohave Target Storage (kaf)	Havasu Target Storage (kaf)
January	1644.0	539.1
February	1698.7	539.1
March	1698.7	557.4
April	1698.7	593.6
May	1753.9	611.4
June	1666.0	611.4
July	1543.0	580.0
August	1417.0	561.1
September	1371.1	557.4
October	1371.1	548.2
November	1478.0	542.7
December	1585.0	539.1

LOWER BASIN SHORTAGE STRATEGIES

As discussed in Section 3.3.3.4, although there are no established shortage criteria for the Lower Basin, shortage rules were developed and used in the model simulation to address concerns related to low Lake Mead elevations. For this DEIS, a “two-level” shortage protection strategy was used.

In Level 1 shortage, the shortage determination is based on comparing the January 1 Lake Mead elevation to a user-input trigger elevation, where the trigger elevations are determined from other modeling studies to protect a significant elevation within a given degree of confidence. If Lake Mead’s elevation at the beginning of the year is less than the

trigger elevation, a Level 1 shortage is declared and certain Lower Basin depletions are reduced. The shortage remains in effect for that calendar year.

For this DEIS, Level 1 protection of elevation 1083 feet (minimum power pool) and Level 1 protection of elevation 1050 feet (minimum water level for operation of Southern Nevada's upper diversion intake) were studied separately. Trigger elevations were input to protect each elevation with an 80% probability; however, actual model runs showed that the protection was less (approximately 74%). As discussed in Section 3.3.4.1, these trigger elevations will be adjusted for the Final EIS to ensure an 80% protection probability.

Under Level 1 shortage, the Central Arizona Project (CAP) depletion is set to a given amount (1.0 maf for this DEIS) and Southern Nevada Water Authority (SNWA) is reduced by 4% of the total reduction as given by:

$$SNWS_{short} = SNWS_{norm} - (0.04*(CAP_{norm}-CAP_{short})/0.96)$$

where the subscripts denote the normal and shortage depletion amounts. Metropolitan Water District (MWD) and other water users (including Mexico) do not take a Level 1 shortage.

Under Level 2 shortages, further cuts are imposed to keep Lake Mead above elevation 1000 feet (the minimum water level for operation of SNWA's lower diversion intake). At the beginning of each year, the rule estimates the end-of-water-year (EOWY) Lake Mead elevation (using Level 1 shortage schedules and normal schedules for other users). If the EOWY elevation is below 1000 feet, CAP and SNWA are cut further to keep Lake Mead above 1000 feet. If CAP delivery is reduced to zero, MWD and Mexico have shortages imposed, again in an amount necessary to keep the reservoir above 1000 feet. Shortages to Mexico consist of shorting Mexico proportionately to the total shortages imposed on United States (U.S.) users:

$$Mex_{short} = Mex_{norm} * (U.S._{shortage}/U.S._{norm})$$

For this DEIS, however, Level 2 shortages were never severe enough to impose shortages on MWD and Mexico.

LOWER BASIN SURPLUS STRATEGIES

As discussed in Chapter 2, several surplus strategies were proposed for inclusion in this DEIS. Of the five alternatives that were developed and analyzed in detail (the No Action Alternative and the four action alternatives), four distinct strategies were used: the Flood Control Strategy, the R strategy, the P strategy, and the Multi-tiered Trigger strategy.

FLOOD CONTROL STRATEGY

Under the Flood Control strategy, a surplus condition is based on the flood control procedures previously described for Lake Mead. For each month, the rule calculates the release necessary for flood control and declares a surplus for the remainder of the calendar year if that release is greater than the release necessary to meet normal downstream demand. Monthly "full" surplus schedules are then set for the remainder of the year, where the monthly surplus schedules are determined by applying monthly percentages to the annual "full" surplus values given in Attachment G (Table G-4). Mexico receives up to an additional 200 kaf only under a flood control surplus. Under most cases, the flood control release is sufficient to meet the increased downstream demand; however, if that is not the case, the rule increases the release so that the surplus demands are met.

All alternatives analyzed in this EIS used the Flood Control surplus strategy, in addition to any other strategies.

R STRATEGY

Under the R surplus strategy, a surplus condition is based on the system space requirement at the beginning of each year. Based on an assumed runoff, Upper and Lower Basin depletion schedules, and Lake Powell and Lake Mead contents at the beginning of the year, the volume of water in excess of the system space requirement at the end of the year is estimated. If that volume is greater than zero, a surplus is declared and full surplus schedules are met for the year. It should be noted that variations of the R strategies include a "volume limited" surplus, where just the computed surplus volume is distributed to certain Lower Basin users (i.e., a full surplus is not assumed).

The assumed runoff corresponds to a particular percentile historical runoff. For example, the 75R strategy assumes a runoff corresponding to the 75th percentile (75% of the historical values are less than that value, or approximately 18.1 maf of natural inflow into Lake Powell).

Based on the original CRSS implementation, the surplus volume is computed by:

SurVol = (PowellStorage + MeadStorage – maxStorage) x (1.0 + aveBankStorCoeff) + runoff – UBdemand – Lbdemand

Where:

PowellStorage = Lake Powell content at the beginning of the year
MeadStorage = Lake Mead content at the beginning of the year
maxStorage = maximum combined storage at Lakes Powell and Mead that will meet the system space requirement at the beginning of the year, assuming 30% of that requirement will be met by the reservoirs upstream of Powell (live capacity of Lakes Powell and Mead - 0.7 x 5.35 maf = 47.96 maf)
aveBankStorageCoeff = average of Lake Powell and Lake Mead bank storage

coefficients
runoff = assumed percentile runoff
UBdemand = Upper Basin depletion scheduled for the year + the average evaporation loss in the Upper Basin (same as assumed in equalization, 560 kaf)
LBdemand = sum of the depletions below Powell + the evaporation losses in the Lower Basin (average loss of 900 kaf at Mead and computed for Lakes Mohave and Havasu, based on the target storage) – average gains between Powell and Mead (801 kaf) – average gains below Mead (427 maf)

P STRATEGY

Under the Protection or P strategy, a surplus is determined if there is sufficient water in Lake Mead to meet normal Lower Basin depletions (7.5 maf), while avoiding the likelihood of a future shortage determination. Analogous to Level 1 shortages, the surplus determination is based on comparing the January 1 Lake Mead elevation to a user-input trigger elevation, where the trigger elevations are determined from other modeling studies to protect the shortage line with a given degree of confidence. If the Lake Mead elevation is greater than the trigger elevation, a full surplus is declared for that calendar year.
For this DEIS, an 80% confidence of avoiding future Level 1 shortages was used to compute the trigger elevations (Section 2.3.5).

MULTI-TIERED TRIGGER STRATEGY

Under the multi-tiered trigger strategies, various amounts of surplus water are made available, depending upon Lake Mead's elevation at the beginning of each calendar year. Both the Six States Alternative and the California Alternative use this strategy. The trigger elevations used in this DEIS for each alternative are discussed in Sections 2.3.3 and 2.3.4 respectively. The surplus depletion schedules used for each alternative are detailed in another attachment.

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Bureau of Reclamation (BOR), 1985, "Colorado River Simulation System: System Overview", Denver, Colorado

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Zagona, E., Shane, R., Fulp, T., Magee, T., and Goranflo, M., 1999, "RiverWare: A Generalized Tool for Complex Reservoir System Modeling", paper (No. 99301) submitted to the Journal of the American Water Resources Association

ATTACHMENT K

Upper Division Depletion Schedule

This attachment consists of a table displaying the schedule of projected Colorado River system depletions, or consumptive use, by the Upper Division. These depletions were used to model the operation of the river system under baseline conditions and the interim surplus criteria alternatives. Shown in the table are projected depletions of the Upper Division states and Arizona's apportionment of water from the Upper Basin. The depletion schedule was developed by the Upper Basin states and was compiled and provided by the Upper Colorado River Commission in December 1995. The depletion schedule was then modified slightly to incorporate data received subsequently from the Ten Tribes Partnership, presented in Attachment Q.

Table K-1
Upper Basin Depletion Schedule (kaf)

Calendar Year	Colorado	Utah	Wyoming	New Mexico	Arizona	Reservoir Evaporation	Total Upper Basin
2002	2419	859	501	449	45	574	4847
2003	2433	873	503	466	45	574	4893
2004	2447	886	505	484	45	574	4940
2005	2494	899	507	501	45	574	5019
2006	2501	913	508	510	45	574	5052
2007	2509	926	510	520	45	574	5084
2008	2517	940	512	529	45	574	5117
2009	2524	953	514	539	45	574	5149
2010	2580	1009	517	548	50	574	5278
2011	2583	1013	519	552	50	574	5291
2012	2586	1017	520	557	50	574	5303
2013	2588	1020	522	561	50	574	5316
2014	2591	1024	524	565	50	574	5328
2015	2594	1028	526	570	50	574	5341
2016	2597	1032	527	573	50	574	5353
2017	2600	1036	529	576	50	574	5365
2018	2603	1041	531	579	50	574	5378
2019	2606	1045	532	583	50	574	5390
2020	2626	1055	535	589	50	574	5429
2021	2629	1062	537	590	50	574	5443
2022	2633	1069	540	591	50	574	5457
2023	2636	1077	542	593	50	574	5471
2024	2639	1084	544	594	50	574	5485
2025	2643	1091	547	595	50	574	5499
2026	2646	1099	549	597	50	574	5514
2027	2649	1107	551	599	50	574	5529
2028	2652	1114	553	600	50	574	5545
2029	2656	1122	556	602	50	574	5560
2030	2675	1129	571	604	50	574	5603
2031	2677	1134	575	604	50	574	5614
2032	2679	1139	580	604	50	574	5626
2033	2680	1145	584	604	50	574	5637
2034	2682	1150	588	604	50	574	5649
2035	2684	1155	593	605	50	574	5660
2036	2686	1160	597	605	50	574	5671
2037	2688	1165	601	605	50	574	5683
2038	2689	1171	605	605	50	574	5694
2039	2691	1176	610	605	50	574	5706
2040	2703	1177	615	605	50	574	5724
2041	2708	1180	622	605	50	574	5739
2042	2712	1184	629	605	50	574	5754
2043	2717	1187	637	605	50	574	5769
2044	2721	1190	644	605	50	574	5784
2045	2726	1194	651	605	50	574	5800
2046	2731	1197	658	605	50	574	5815
2047	2735	1200	665	605	50	574	5830
2048	2740	1203	673	605	50	574	5845
2049	2744	1207	680	605	50	574	5860
2050	2776	1207	687	605	50	574	5899

ATTACHMENT L

Sensitivity Analysis Comparing Baseline with Transfers to Baseline Without Transfers

This attachment illustrates the water surface elevations of Lake Powell and Lake Mead under baseline conditions with and without the California water transfers. The transfers involve changes in the delivery point for certain quantities of water as proposed in part of California's Colorado River Water Use Plan.

Sensitivity Analysis Comparing the Modeled Baseline Without Transfers to Baseline With Transfers Conditions

OVERVIEW

This attachment provides a summary of the sensitivity analysis conducted to assess the potential effect of the modeled California intrastate water transfers. The sensitivity analysis compares the results of the modeled baseline without transfers condition to those of the baseline with transfers condition.

Only two potential hydrologic effects resulting from the modeled California intrastate water transfers were observed. The first effect is the lower amount of surplus water that California would receive under the baseline without transfers condition reflecting a lower depletion schedule that was used to model California's maximum full surplus demand projections. The second is the potential change in river flows for that portion of the river located between Parker Dam and Imperial Dam. This potential change in river flows is associated with the change in the point of delivery of water that is being transferred between the agricultural agencies and MWD.

Additional discussion on these two potential hydrologic effects and other hydrologic aspects evaluated under this sensitivity analysis follows:

LAKE POWELL WATER SURFACE ELEVATIONS

The Lake Powell water surface elevations observed under the modeled baseline without transfers condition were compared to the baseline with transfers condition. The result of this comparative analysis indicates that there is essentially no difference between the water surface levels observed under the two modeled baseline conditions. Figure L-1 presents a comparison of the 90th, 50th and 10th percentile values observed under the two modeled baseline conditions (with and without transfers). A summary of this same information is presented in tabular format in Tables L-1, L-2 and L-3, respectively.

LAKE MEAD WATER SURFACE ELEVATIONS

Similar to the water surface elevations observed for Lake Powell, the differences that were observed in Lake Mead water surface elevations under the two baseline conditions (with and without transfers) were minimal to none. Observed differences in the 90th, 50th and 10th percentile values of the two baseline conditions varied less than plus or minus two feet. A graphical comparison of the 90th, 50th and 10th percentile values for the two modeled baseline conditions is presented in Figure L-2. A similar comparison of the 90th, 50th and 10th percentile values for the modeled conditions are presented in tabular format in Tables L-4, L-5 and L-6, respectively.

HOOVER DAM FLOOD CONTROL RELEASES

The differences in the frequency of Hoover Dam (Lake Mead) flood control releases between the two modeled baseline conditions (with and without transfers) averaged one-half of one percent higher under the baseline with transfers condition during the 15-year interim surplus criteria period. This average difference increased to seven-tenths of one percent for the ensuing 34-year period. A graphical comparison of the frequency of Lake Mead flood releases under the two modeled baseline conditions is presented in Figure L-3. The slightly higher frequency of Hoover

Dam flood control releases observed under the baseline with transfers condition can be mostly attributed to the lower depletion schedule that was used to model California's full surplus demands under these modeled conditions (see discussion on Water Supply below). Since the magnitude of the surplus deliveries are lower under the baseline with transfers condition, more water remains in Lake Mead and this increases the probability of more frequent flood control releases, however slightly.

WATER SUPPLY

The water deliveries to the Lower Division states under the two baseline conditions (with and without transfers) were evaluated to determine the effect of the modeled water transfers, if any. A summary of the evaluation of each states' water deliveries under the two different baseline conditions follows:

Arizona

The observed magnitude and corresponding frequency of water deliveries to Arizona under the two baseline conditions were essentially the same. No significant differences in the amount of water that Arizona would receive under the two baseline conditions were observed. Figure L-4, presents a comparison of the 90th, 50th and 10th percentile values for the modeled Arizona water deliveries under the two baseline conditions, respectively. Figure L-5 presents a comparison of the frequency of occurrence of different amounts of annual water deliveries to Arizona during the modeled 15-year interim surplus criteria period. Figure L-6 presents a similar comparison for the ensuing 34-year period (2017 to 2050). As illustrated in these two figures, there is very little variation in both the frequency and magnitude of water deliveries to Arizona between the two modeled baseline conditions.

California

The observed water deliveries to California under the two baseline conditions differed as a result of the different depletion schedules used to model California's demands. Different depletion schedules incorporating different maximum full surplus demand schedules were used to model the two baseline conditions. California's modeled full surplus depletion schedule under the baseline without transfers condition begins at approximately 5.52 maf (year 2002), increases steadily to 5.56 maf by 2015, and remains at this level thereafter. California's modeled full surplus depletion schedule under the baseline with transfers condition begins at approximately 5.49 maf (year 2002), steadily decreases to approximately 5.2 maf by 2025 and generally remains close to this level thereafter. As a result of the different depletion schedules used to model the two baseline conditions, the observed magnitude of surplus deliveries to California is substantially higher under the baseline without transfers condition, as illustrated in Figure L-7 which compares the 90th percentile values of the modeled depletions. In general, the 90th percentile values coincide with the maximum full surplus depletion schedules that were used to model the respective baseline conditions. The frequency and magnitude of normal condition deliveries to California did not differ and there were no shortage condition deliveries observed as illustrated in Figure L-9. Figure L-8 presents a comparison of the frequency of occurrence of different annual water deliveries to California during the modeled 15-year interim surplus criteria period. Figure L-9 presents a similar comparison for the ensuing 34-year period (2017 to 2050). As illustrated in these two figures, only the magnitude of the surplus deliveries differ between the two baseline conditions (i.e. the frequency of surplus deliveries is similar).

Nevada

The observed magnitude and corresponding frequency of water deliveries to Nevada under the two different modeled baseline conditions were essentially the same. No significant differences in the amount of water that Nevada would receive under the two baseline conditions were observed. Figure L-10 presents a comparison of the 90th, 50th and 10th percentile values for the modeled Nevada water deliveries under the two baseline conditions, respectively. Figure L-11 presents a comparison of the frequency of occurrence of different annual water delivery amounts to Nevada during the modeled 15-year interim surplus criteria period. Figure L-12 presents a similar comparison for the ensuing 34-year period (2017 to 2050). As illustrated in these two figures, there is very little variation in both the frequency and magnitude of water deliveries to Nevada between the two modeled baseline conditions.

RIVER FLOWS

Only two river segments were observed to be affected by the modeled California intrastate water transfers, they are – the reach of river between Parker Dam and the Palo Verde Diversion Dam and the reach of river between the Palo Verde Diversion Dam and Imperial Dam. The reduced river flow (between 200,000 to 300,000 afy) below Parker Dam is associated with the change in diversion points resulting from the modeled California intrastate water transfers. This amount accounts for approximately 3 to 4 percent of the approximate average seven maf of annual flow that was observed in these reaches of the Colorado River. The transfers are anticipated to occur during the peak months when flows in these lower river reaches are at their seasonal highs. Figures L-13a through L-16b present a graphical comparison of the seasonal flow ranges that were projected downstream of the Palo Verde Diversion Dam for years 2006, 2016, 2025 and 2050. Therefore, in terms of mean monthly flows, the change in point of diversion of the transferred water may reduce the peak flows that range from 10,000 cfs to 12,500 cfs by as much as 800 cfs. While this reduction in mean monthly flows appears to be significant, the potentially reduced flows are still within the normal annal flow range of these reaches of the Colorado River (annual range is between 3,500 cfs to 12,500 cfs). As such, the potential reduced flows are not expected to result in any significant hydrological, environmental or socio-economic impacts.

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Figure L-1
Sensitivity Analysis – California Intrastate Water Transfers
Lake Powell End of July Water Surface Elevations – 90th, 50th and 10th Percentile Values

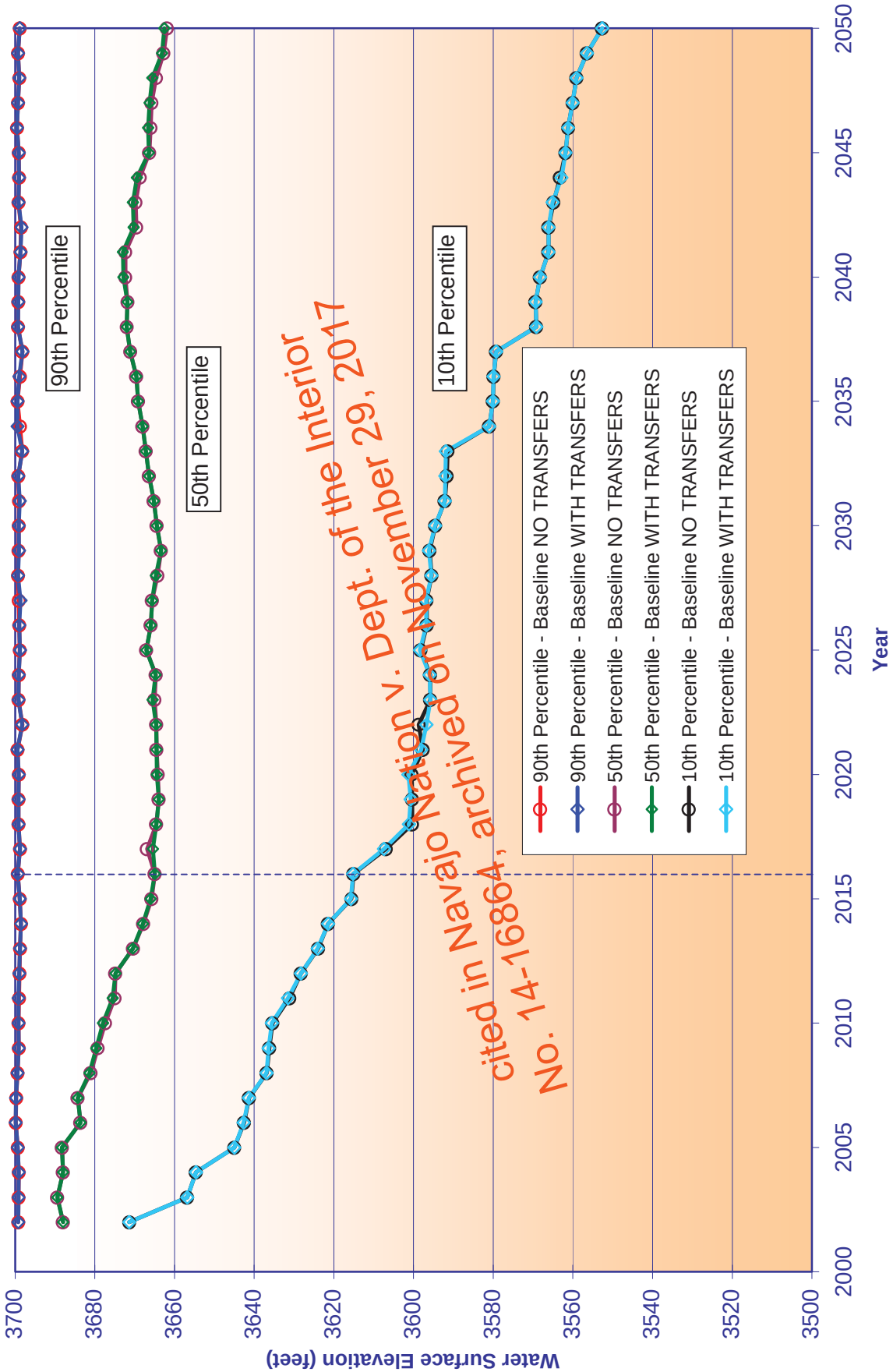


Table L-1

Lake Powell 90th Percentile Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
7/31/02	3699.2	3699.2
7/31/03	3699.2	3699.2
7/31/04	3699.1	3699.1
7/31/05	3699.3	3699.3
7/31/06	3699.8	3699.9
7/31/07	3699.7	3699.7
7/31/08	3699.4	3699.4
7/31/09	3699.0	3699.0
7/31/10	3699.2	3699.2
7/31/11	3699.0	3699.1
7/31/12	3698.9	3698.9
7/31/13	3698.8	3698.8
7/31/14	3698.5	3698.5
7/31/15	3698.8	3698.8
7/31/16	3699.3	3699.3
7/31/17	3698.7	3698.7
7/31/18	3699.1	3699.1
7/31/19	3699.1	3699.1
7/31/20	3699.1	3699.1
7/31/21	3699.4	3699.4
7/31/22	3698.1	3698.2
7/31/23	3699.1	3699.1
7/31/24	3699.1	3699.1
7/31/25	3698.8	3698.8
7/31/26	3698.9	3698.9
7/31/27	3699.1	3698.6
7/31/28	3699.3	3699.3
7/31/29	3699.1	3699.0
7/31/30	3699.0	3699.0
7/31/31	3699.0	3698.8
7/31/32	3699.2	3699.2
7/31/33	3698.2	3698.2
7/31/34	3698.8	3699.3
7/31/35	3699.4	3699.4
7/31/36	3698.7	3699.0
7/31/37	3698.1	3698.2
7/31/38	3699.2	3699.3
7/31/39	3699.2	3699.2
7/31/40	3699.1	3699.1
7/31/41	3698.6	3698.7
7/31/42	3698.5	3698.4
7/31/43	3699.1	3699.1
7/31/44	3699.0	3699.0
7/31/45	3699.1	3699.1
7/31/46	3699.5	3699.5
7/31/47	3699.3	3699.3
7/31/48	3698.9	3698.9
7/31/49	3699.2	3699.2
7/31/50	3698.8	3698.8

Table L-2

Lake Powell 50th Percentile Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
7/31/02	3688.0	3688.0
7/31/03	3689.4	3689.4
7/31/04	3688.0	3688.0
7/31/05	3688.2	3688.3
7/31/06	3683.5	3683.5
7/31/07	3684.2	3684.3
7/31/08	3681.0	3681.3
7/31/09	3679.3	3679.6
7/31/10	3677.4	3677.9
7/31/11	3675.0	3675.5
7/31/12	3674.8	3674.8
7/31/13	3670.4	3670.4
7/31/14	3667.8	3667.9
7/31/15	3665.8	3666.0
7/31/16	3665.0	3665.0
7/31/17	3666.9	3665.4
7/31/18	3664.5	3664.6
7/31/19	3663.9	3663.9
7/31/20	3664.2	3664.4
7/31/21	3664.5	3664.5
7/31/22	3664.6	3664.6
7/31/23	3665.0	3665.5
7/31/24	3664.7	3664.7
7/31/25	3667.0	3667.0
7/31/26	3666.0	3665.9
7/31/27	3665.6	3665.6
7/31/28	3664.3	3664.7
7/31/29	3663.4	3663.4
7/31/30	3664.4	3664.5
7/31/31	3665.2	3665.2
7/31/32	3666.4	3666.4
7/31/33	3667.2	3667.2
7/31/34	3668.0	3668.0
7/31/35	3669.1	3669.1
7/31/36	3669.6	3669.6
7/31/37	3671.1	3671.1
7/31/38	3672.0	3672.0
7/31/39	3671.8	3671.8
7/31/40	3672.4	3672.8
7/31/41	3672.3	3673.0
7/31/42	3669.5	3670.2
7/31/43	3669.7	3670.4
7/31/44	3668.7	3669.4
7/31/45	3666.3	3666.4
7/31/46	3666.0	3666.6
7/31/47	3665.8	3666.2
7/31/48	3664.6	3665.6
7/31/49	3662.8	3663.1
7/31/50	3661.9	3662.5

Table L-3

Lake Powell 10th Percentile Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
7/31/02	3671.4	3671.4
7/31/03	3656.8	3656.8
7/31/04	3654.6	3654.6
7/31/05	3645.0	3645.0
7/31/06	3642.5	3642.6
7/31/07	3641.2	3641.3
7/31/08	3636.8	3636.9
7/31/09	3636.2	3636.4
7/31/10	3635.4	3635.6
7/31/11	3631.1	3631.5
7/31/12	3628.2	3628.2
7/31/13	3623.9	3624.1
7/31/14	3621.5	3621.5
7/31/15	3615.6	3615.7
7/31/16	3615.0	3615.2
7/31/17	3606.9	3607.4
7/31/18	3600.3	3601.2
7/31/19	3600.3	3600.7
7/31/20	3600.5	3601.2
7/31/21	3597.7	3598.0
7/31/22	3598.7	3596.8
7/31/23	3595.7	3595.8
7/31/24	3595.8	3596.0
7/31/25	3598.2	3598.4
7/31/26	3596.6	3596.8
7/31/27	3596.7	3596.8
7/31/28	3595.5	3595.5
7/31/29	3595.9	3596.1
7/31/30	3594.5	3594.6
7/31/31	3592.2	3592.2
7/31/32	3591.6	3592.1
7/31/33	3591.4	3591.9
7/31/34	3581.0	3581.0
7/31/35	3580.1	3580.1
7/31/36	3579.9	3579.9
7/31/37	3579.3	3579.3
7/31/38	3569.1	3569.1
7/31/39	3569.4	3569.4
7/31/40	3568.2	3568.2
7/31/41	3566.1	3566.1
7/31/42	3566.1	3566.1
7/31/43	3564.9	3565.1
7/31/44	3563.2	3562.9
7/31/45	3561.9	3561.9
7/31/46	3561.2	3561.2
7/31/47	3560.0	3560.0
7/31/48	3559.1	3559.1
7/31/49	3556.4	3556.5
7/31/50	3552.6	3552.7

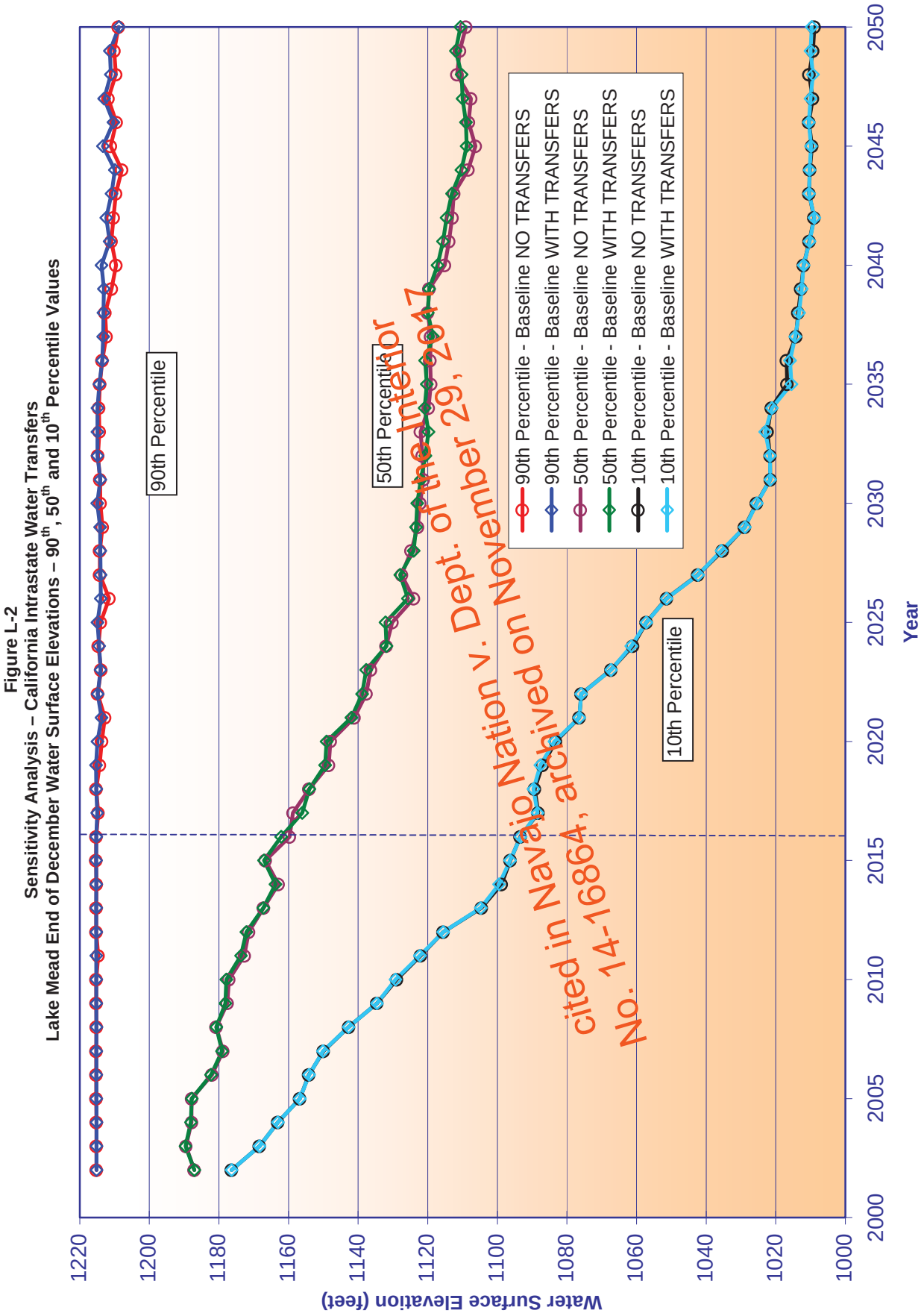


Table L-4

Lake Mead 90th Percentile Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
12/31/02	1215.2	1215.2
12/31/03	1215.2	1215.2
12/31/04	1215.1	1215.1
12/31/05	1215.2	1215.2
12/31/06	1215.2	1215.2
12/31/07	1215.2	1215.2
12/31/08	1215.1	1215.1
12/31/09	1215.2	1215.2
12/31/10	1215.2	1215.2
12/31/11	1214.7	1215.2
12/31/12	1215.3	1215.3
12/31/13	1215.2	1215.2
12/31/14	1215.2	1215.3
12/31/15	1215.3	1215.3
12/31/16	1215.2	1215.2
12/31/17	1214.7	1215.0
12/31/18	1215.2	1215.2
12/31/19	1214.2	1215.3
12/31/20	1213.7	1214.9
12/31/21	1212.8	1213.7
12/31/22	1214.8	1214.8
12/31/23	1213.9	1214.0
12/31/24	1214.6	1214.4
12/31/25	1214.0	1214.9
12/31/26	1211.5	1213.9
12/31/27	1214.2	1214.0
12/31/28	1214.2	1214.1
12/31/29	1213.5	1214.1
12/31/30	1214.1	1214.9
12/31/31	1214.1	1214.0
12/31/32	1214.7	1214.9
12/31/33	1214.3	1214.9
12/31/34	1214.5	1214.9
12/31/35	1214.2	1214.3
12/31/36	1213.5	1213.5
12/31/37	1212.3	1213.2
12/31/38	1212.7	1213.2
12/31/39	1210.9	1213.0
12/31/40	1209.5	1213.7
12/31/41	1210.9	1211.4
12/31/42	1210.3	1212.3
12/31/43	1209.6	1210.9
12/31/44	1207.9	1209.9
12/31/45	1211.1	1213.3
12/31/46	1209.5	1210.3
12/31/47	1211.8	1213.0
12/31/48	1209.7	1211.1
12/31/49	1210.1	1211.3
12/31/50	1208.9	1208.7

Table L-5

Lake Mead 50th Percentile
Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
12/31/02	1187.0	1187.0
12/31/03	1189.5	1189.7
12/31/04	1187.8	1188.1
12/31/05	1187.8	1187.8
12/31/06	1182.0	1182.2
12/31/07	1178.9	1179.1
12/31/08	1180.8	1180.8
12/31/09	1177.6	1178.2
12/31/10	1177.1	1177.9
12/31/11	1172.7	1173.6
12/31/12	1171.4	1172.1
12/31/13	1167.2	1167.2
12/31/14	1163.0	1163.8
12/31/15	1166.6	1167.1
12/31/16	1159.8	1162.1
12/31/17	1158.7	1156.0
12/31/18	1154.0	1154.0
12/31/19	1148.5	1149.5
12/31/20	1148.0	1149.1
12/31/21	1141.1	1141.9
12/31/22	1137.7	1138.9
12/31/23	1136.4	1137.7
12/31/24	1131.9	1131.9
12/31/25	1130.3	1132.2
12/31/26	1124.0	1125.7
12/31/27	1127.5	1128.0
12/31/28	1124.7	1124.0
12/31/29	1122.9	1123.3
12/31/30	1122.2	1123.0
12/31/31	1121.3	1122.0
12/31/32	1121.5	1120.7
12/31/33	1122.0	1119.8
12/31/34	1119.8	1120.9
12/31/35	1119.1	1120.3
12/31/36	1119.3	1120.7
12/31/37	1119.1	1118.5
12/31/38	1120.0	1120.0
12/31/39	1119.6	1119.6
12/31/40	1115.2	1117.2
12/31/41	1113.9	1115.7
12/31/42	1113.0	1114.6
12/31/43	1112.5	1113.0
12/31/44	1108.4	1110.3
12/31/45	1106.3	1108.8
12/31/46	1108.3	1109.0
12/31/47	1107.6	1110.0
12/31/48	1111.5	1110.2
12/31/49	1110.8	1111.9
12/31/50	1109.0	1110.6

Table L-6

Lake Mead 10th Percentile Water Surface Elevations

Date	Baseline with Transfers	Baseline No Transfers
12/31/02	1176.4	1176.4
12/31/03	1168.3	1168.3
12/31/04	1163.1	1163.0
12/31/05	1156.7	1156.7
12/31/06	1154.1	1154.1
12/31/07	1149.9	1150.1
12/31/08	1142.8	1142.7
12/31/09	1134.6	1134.6
12/31/10	1129.0	1129.3
12/31/11	1122.1	1122.2
12/31/12	1115.6	1115.6
12/31/13	1104.6	1104.8
12/31/14	1098.8	1099.5
12/31/15	1096.2	1096.3
12/31/16	1093.4	1093.3
12/31/17	1088.3	1088.5
12/31/18	1089.3	1089.6
12/31/19	1087.0	1087.7
12/31/20	1083.3	1083.6
12/31/21	1076.5	1076.4
12/31/22	1075.9	1075.9
12/31/23	1067.4	1067.3
12/31/24	1061.1	1061.5
12/31/25	1057.2	1057.2
12/31/26	1051.4	1051.3
12/31/27	1042.4	1042.3
12/31/28	1035.3	1035.6
12/31/29	1029.0	1028.9
12/31/30	1025.5	1025.5
12/31/31	1021.6	1021.6
12/31/32	1021.7	1021.6
12/31/33	1022.5	1023.1
12/31/34	1021.3	1021.1
12/31/35	1016.7	1015.5
12/31/36	1016.8	1015.9
12/31/37	1014.2	1014.4
12/31/38	1013.6	1013.3
12/31/39	1012.8	1012.6
12/31/40	1012.0	1012.0
12/31/41	1010.4	1010.3
12/31/42	1009.0	1009.0
12/31/43	1010.4	1010.4
12/31/44	1010.2	1010.3
12/31/45	1009.6	1009.9
12/31/46	1010.5	1010.5
12/31/47	1009.4	1010.0
12/31/48	1010.4	1009.4
12/31/49	1009.4	1010.0
12/31/50	1008.9	1009.7

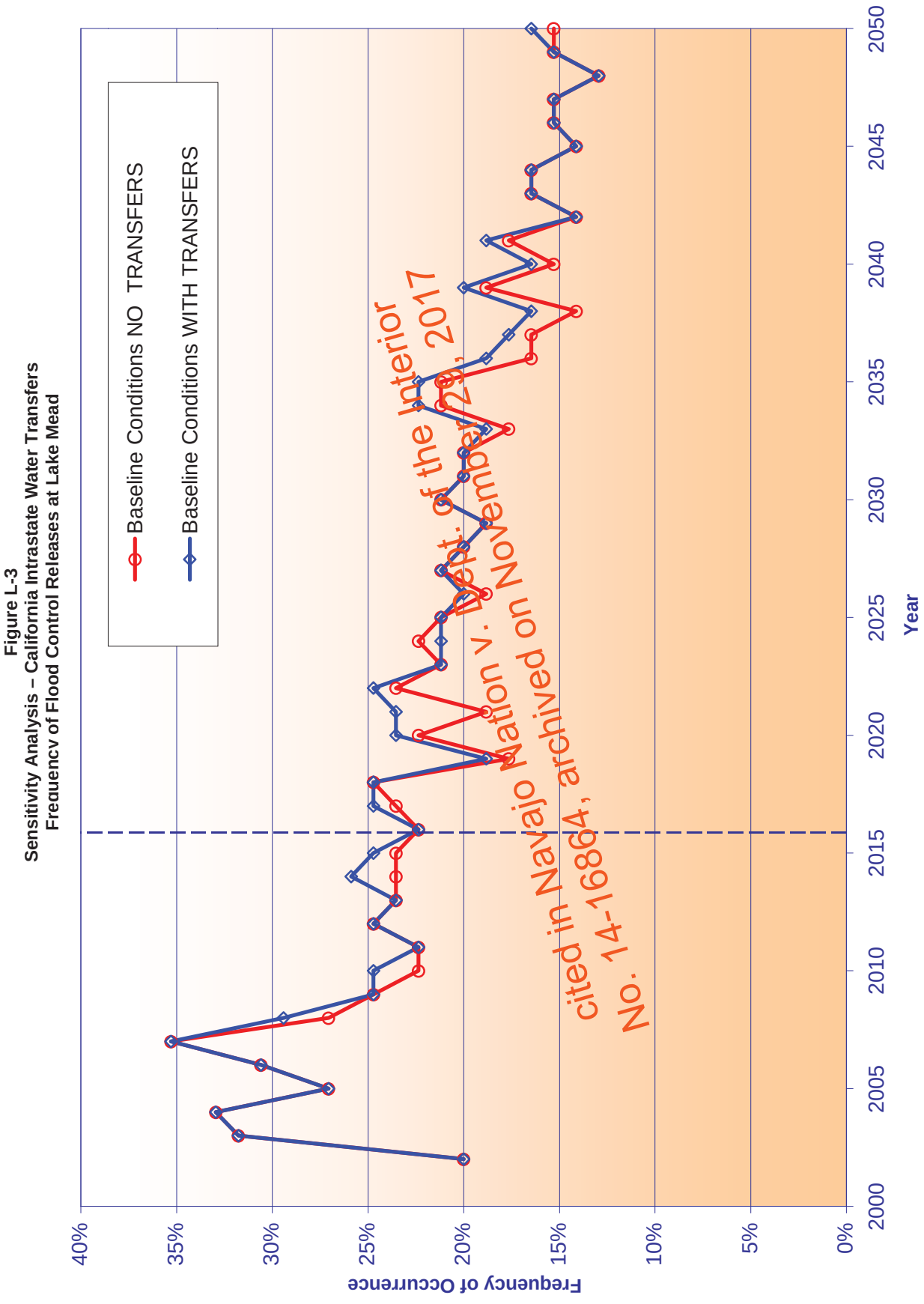


Figure L-3
Sensitivity Analysis – California Intrastate Water Transfers
Frequency of Flood Control Releases at Lake Mead

Figure L-4
Sensitivity Analysis – California Intrastate Water Transfers
Arizona Annual Depletions – 90th, 50th and 10th Percentile Values

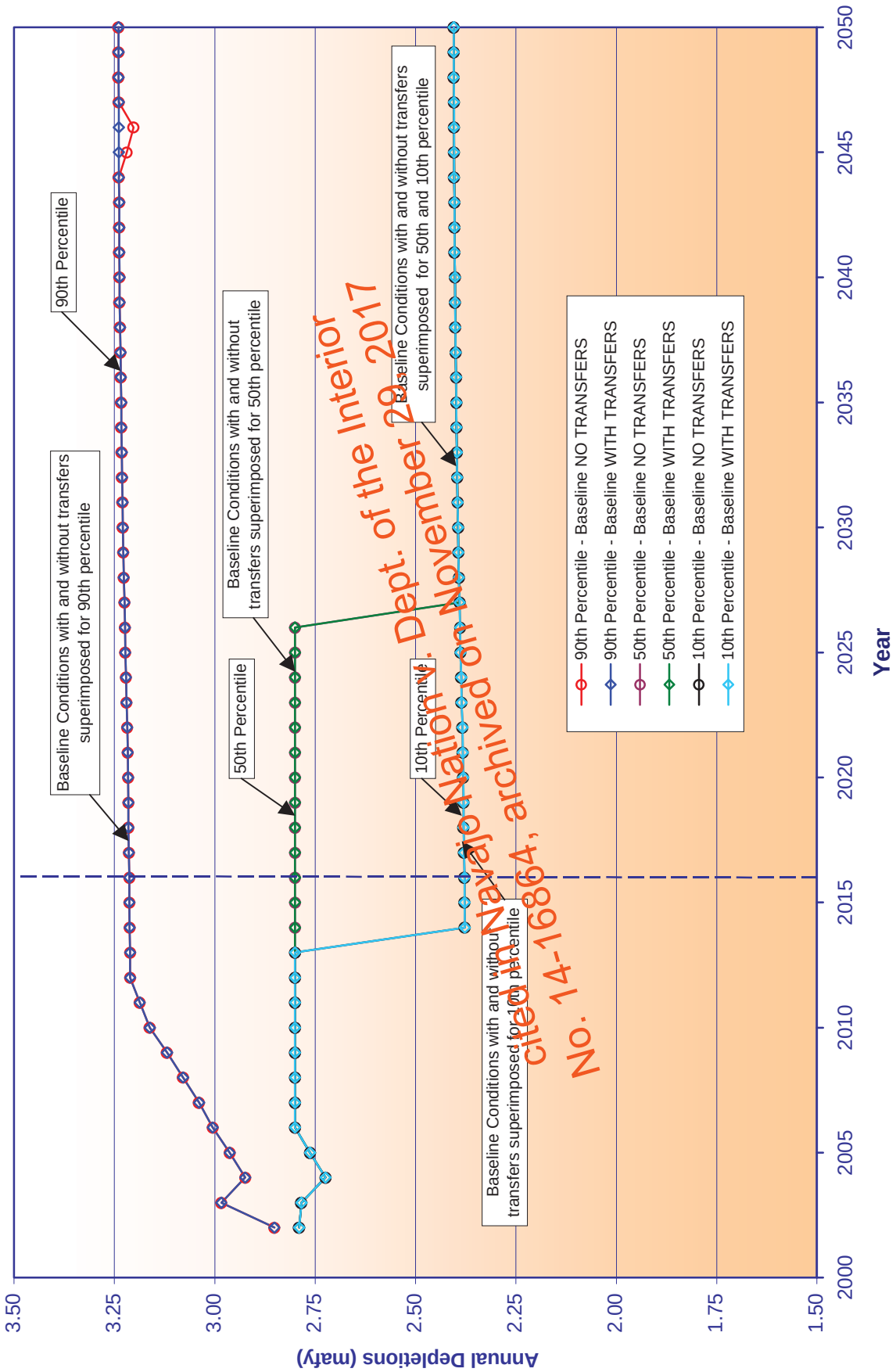


Figure L-5
Sensitivity Analysis – California Intrastate Water Transfers
Arizona Annual Depletions – Percent of Values Greater than or Equal to (Years 2002 – 2016)

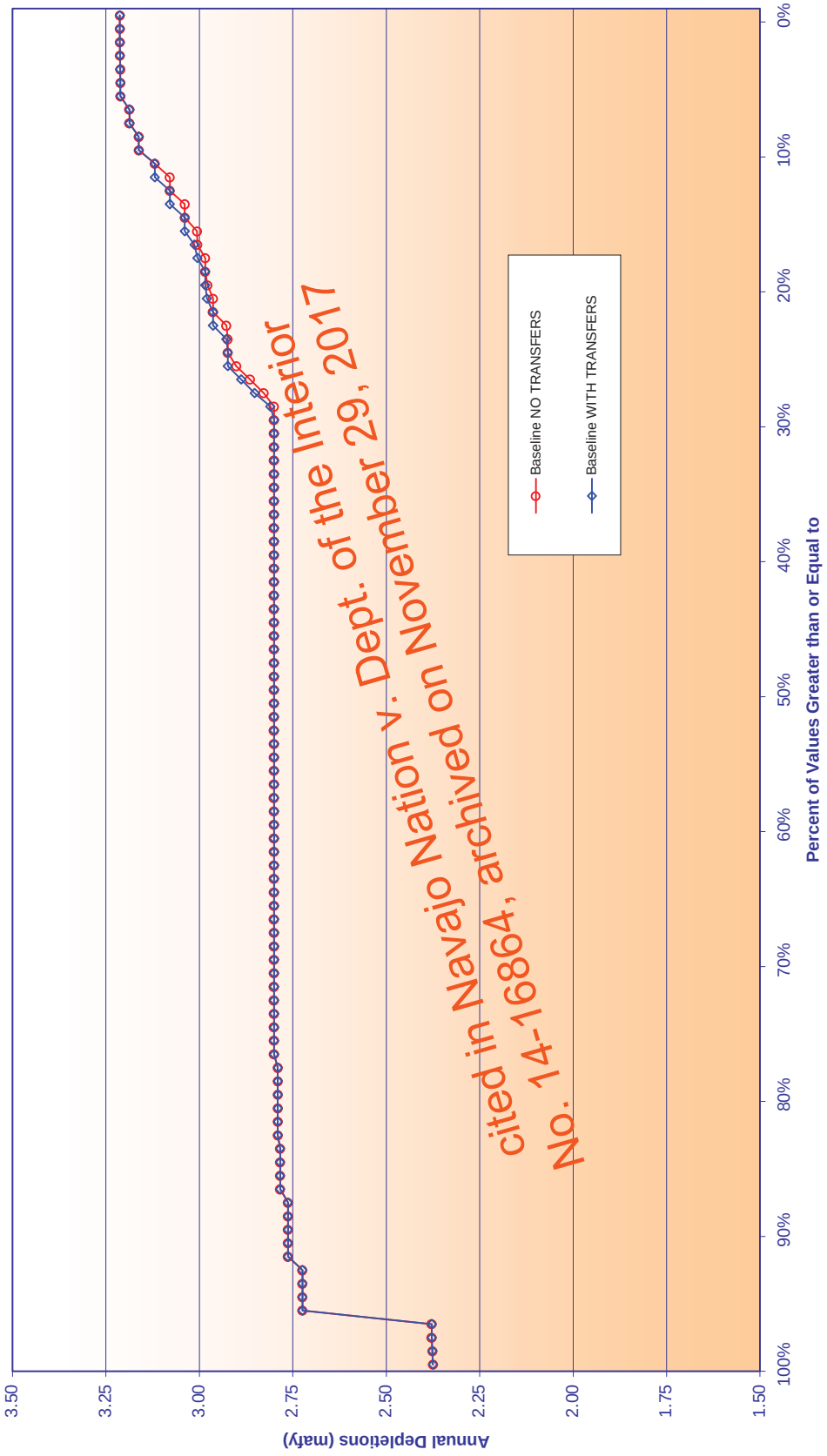


Figure L-6
Sensitivity Analysis – California Intrastate Water Transfers
Arizona Annual Depletions - Percent of Values Greater than or Equal to (Years 2017 – 2050)

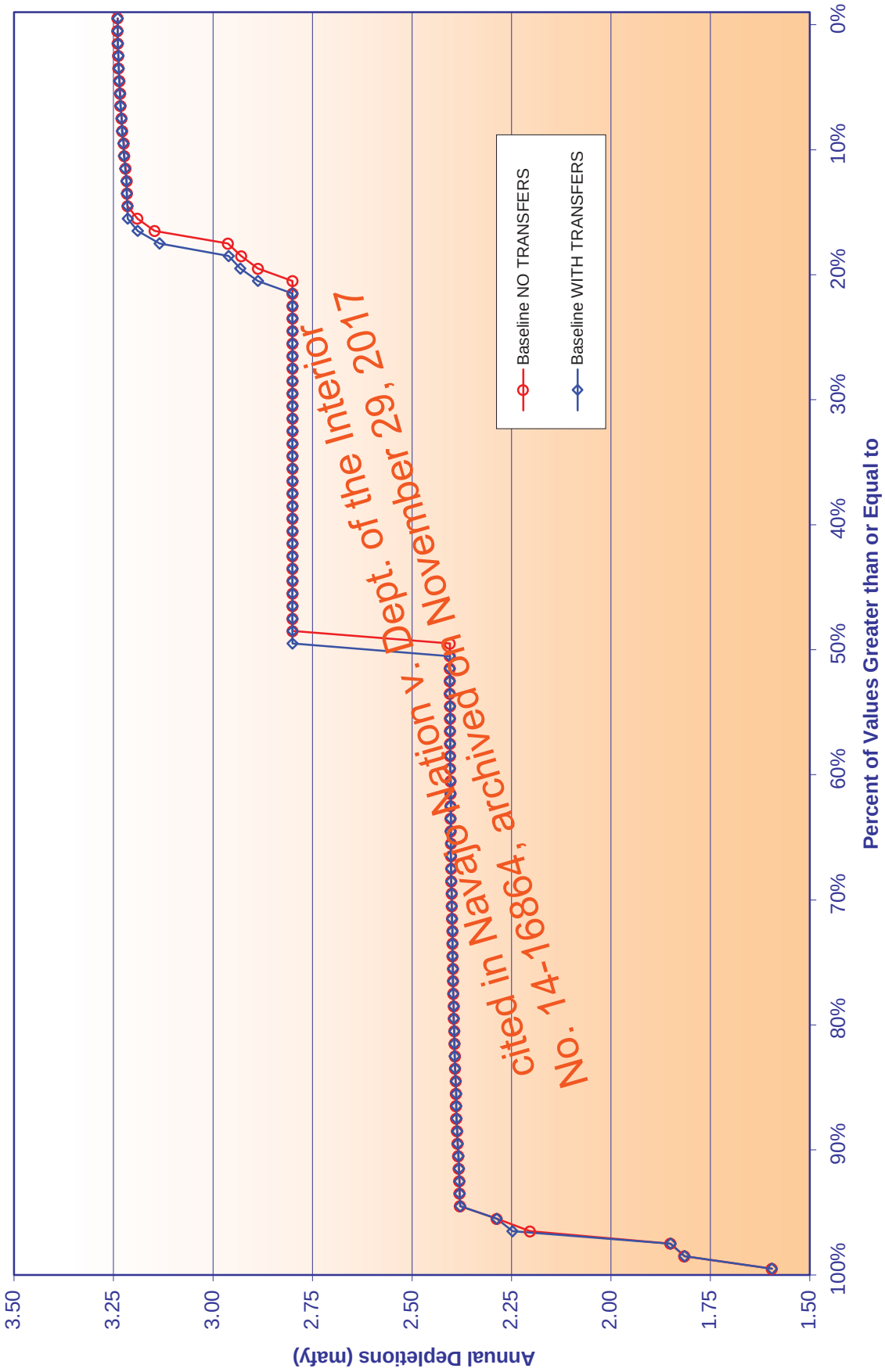


Figure L-7
Sensitivity Analysis - California Intrastate Water Transfers
California Annual Depletions – 90th, 50th and 10th Percentile Values

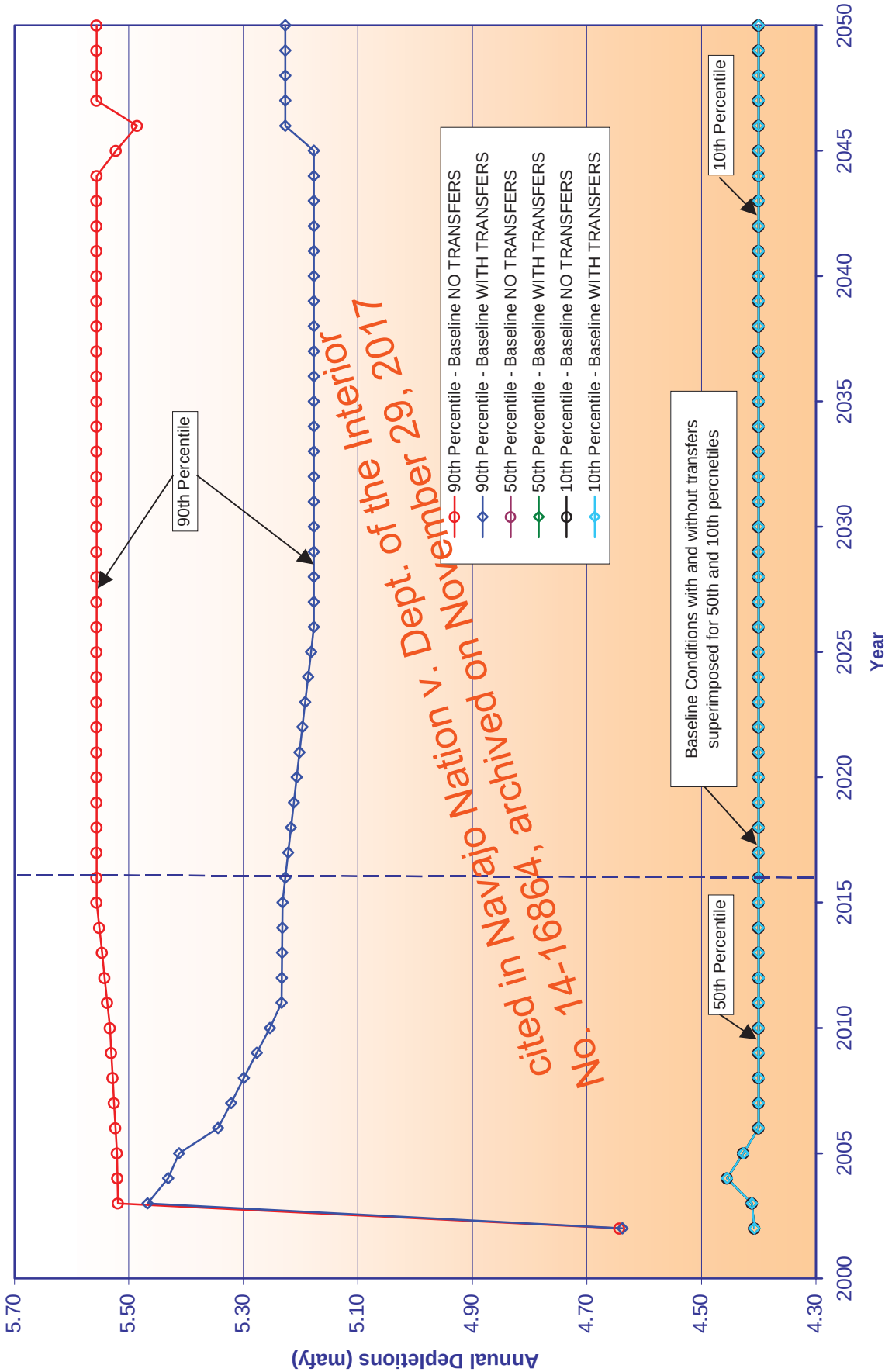


Figure L-8
Sensitivity Analysis - California Intrastate Water Transfers
California Annual Depletions – Percent of Values Greater than or Equal to (Years 2002 – 2016)

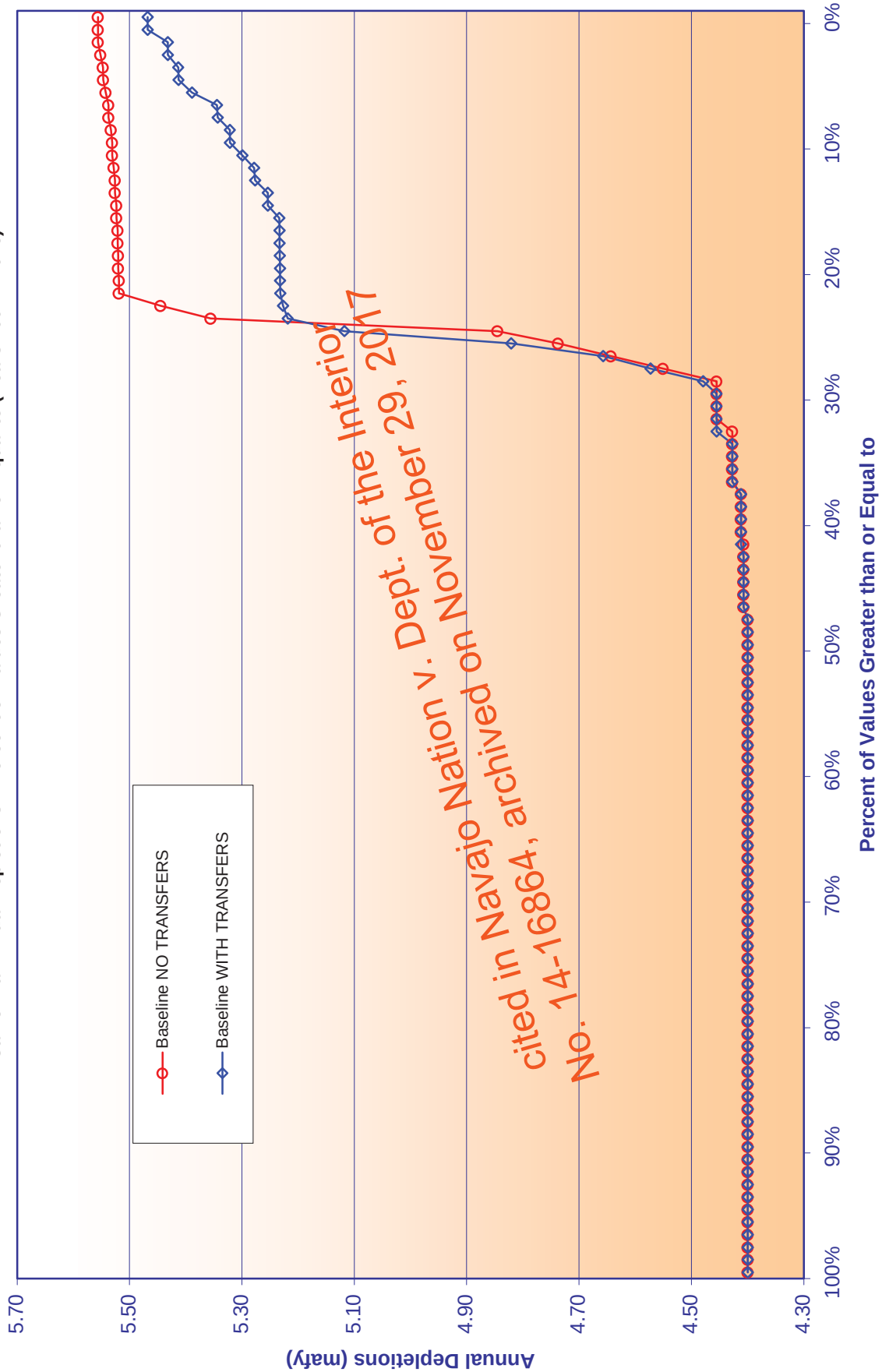
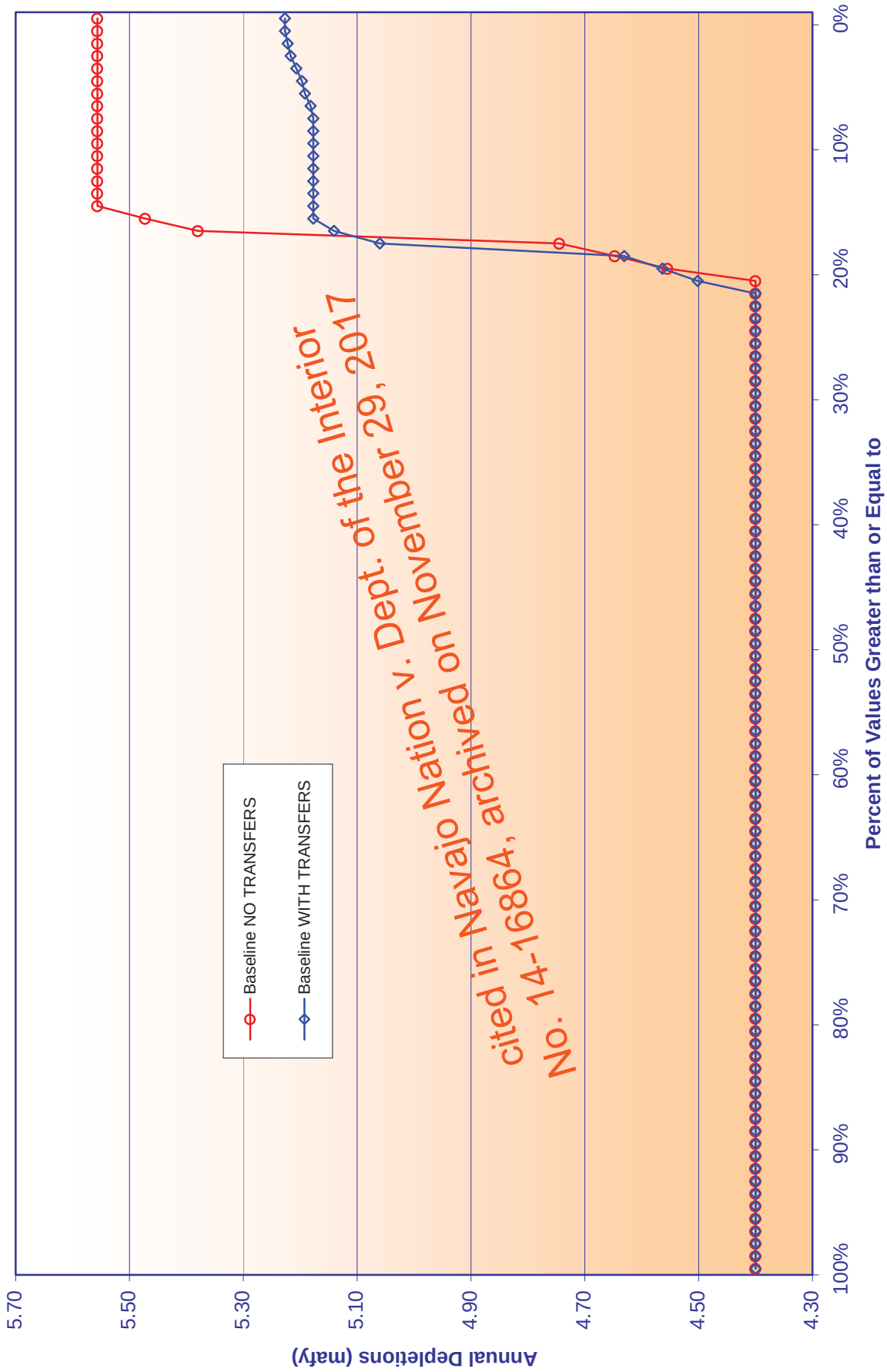


Figure L-9
Sensitivity Analysis - California Intrastate Water Transfers
California Annual Depletions – Percent of Values Greater than or Equal to (Years 2017 – 2050)



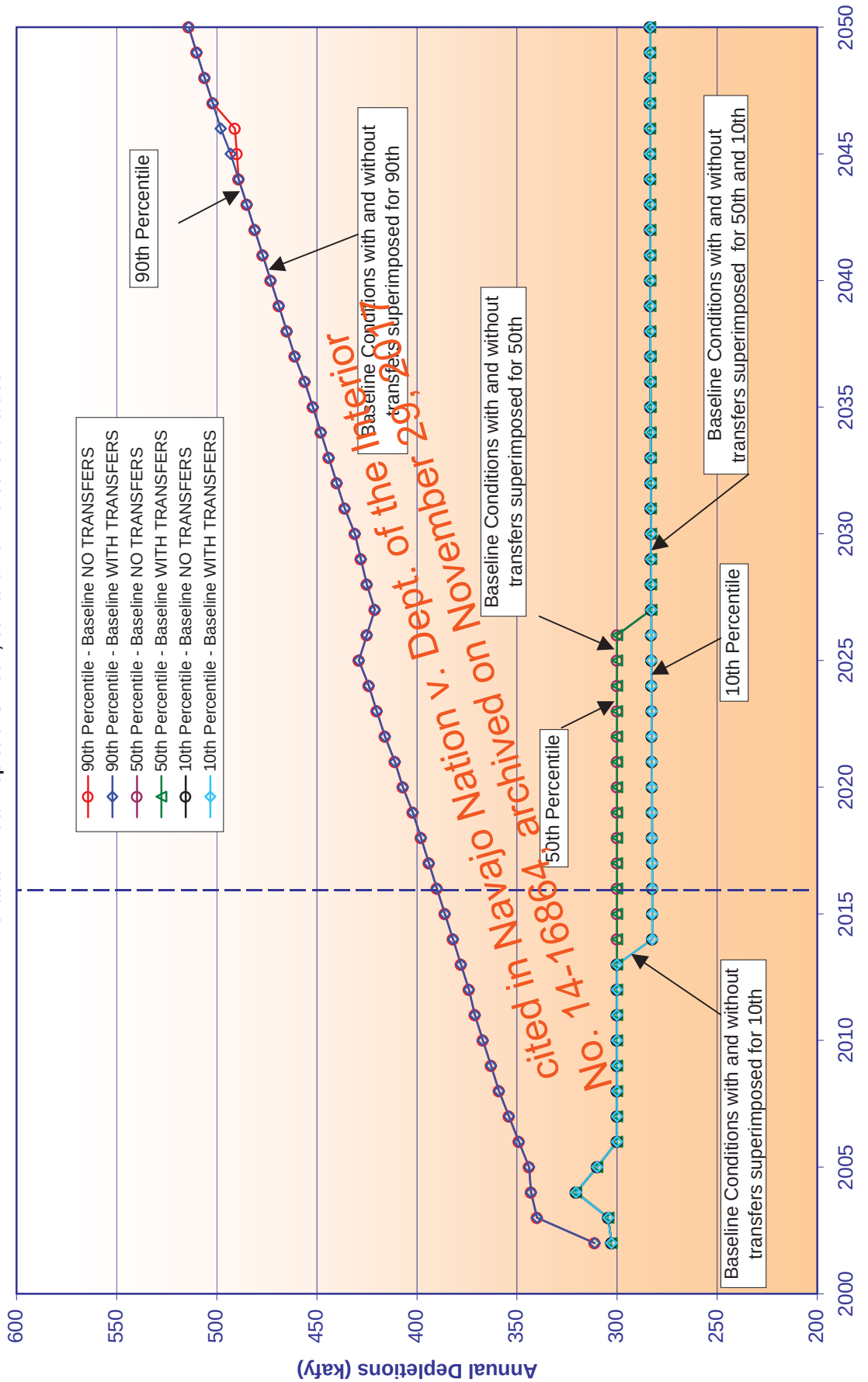


Figure L-10
Sensitivity Analysis - California Intrastate Water Transfers
Nevada Annual Depletions – 90th, 50th and 10th Percentile Values

Figure L-11
Sensitivity Analysis - California Intrastate Water Transfers
Nevada Annual Depletions – Percent of Values Greater than or Equal to (Years 2002 – 2016)

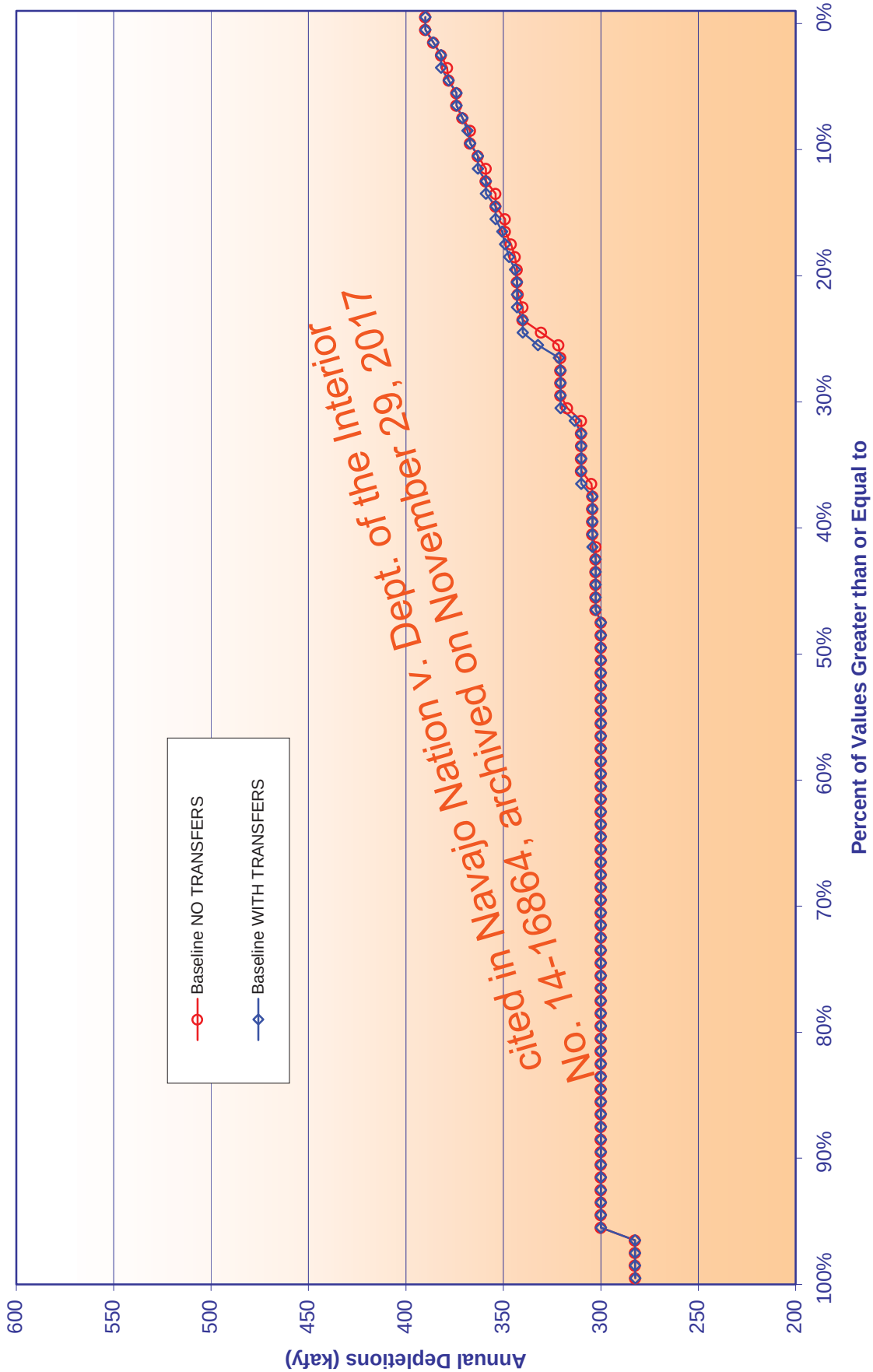


Figure L-12
Sensitivity Analysis - California Intrastate Water Transfers
Nevada Annual Depletions – Percent of Values Greater than or Equal to (Years 2017 – 2050)

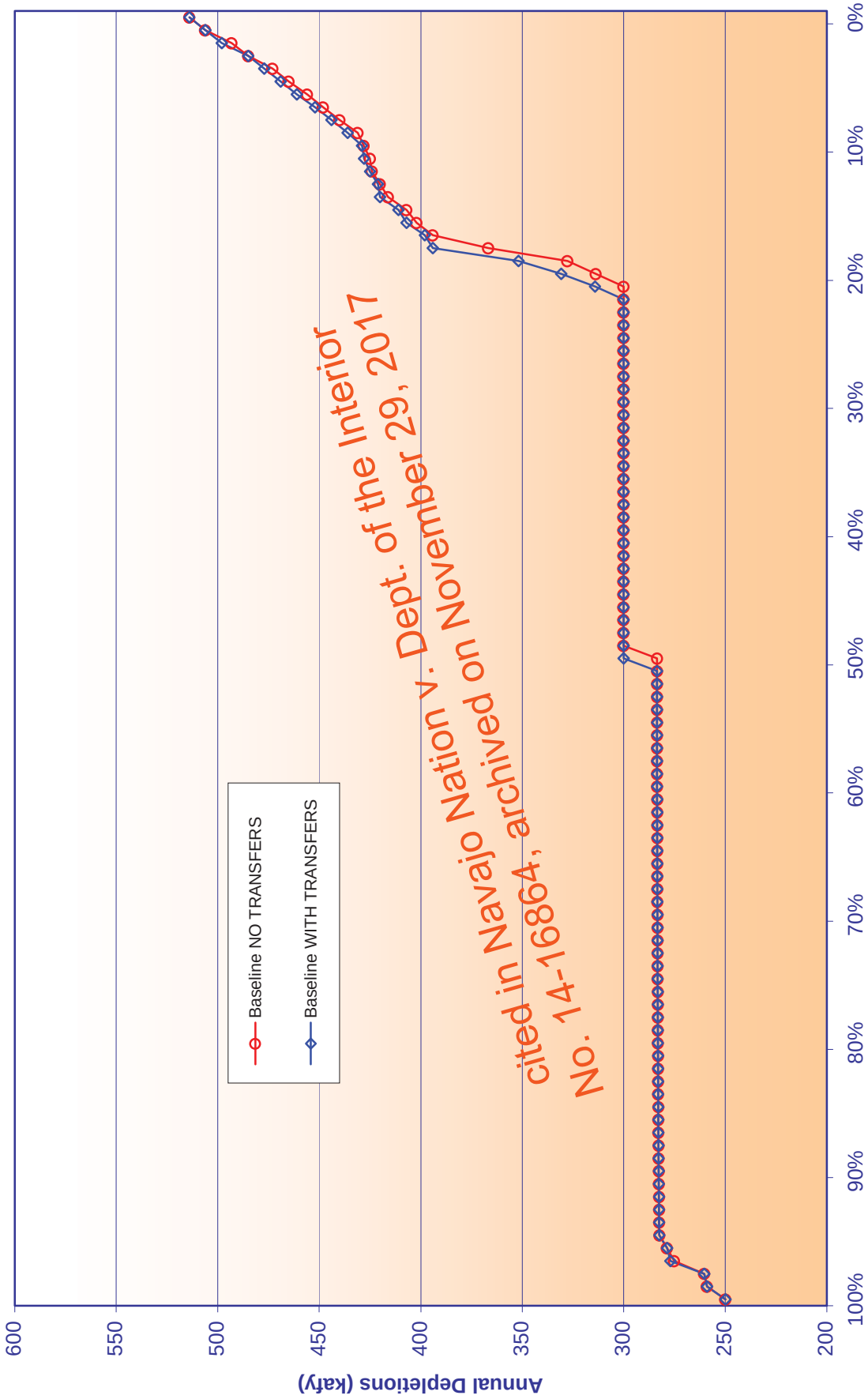
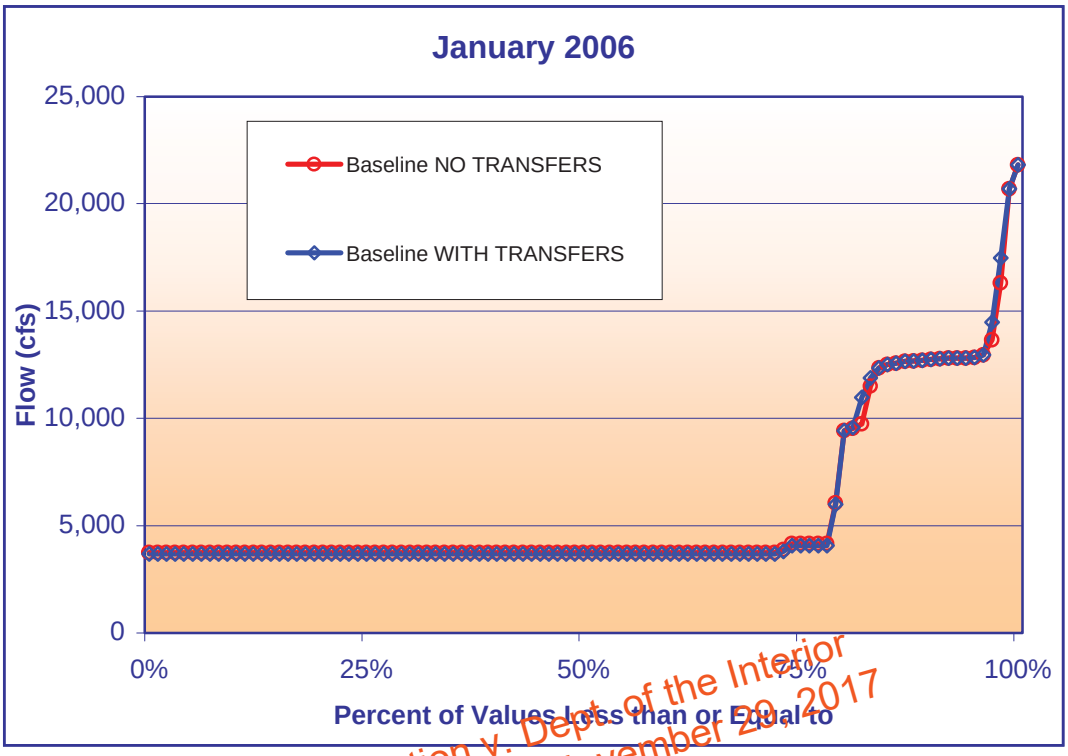


Figure L-13a
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Winter Season Flows as Represented by January Flows
Years 2006 and 2016



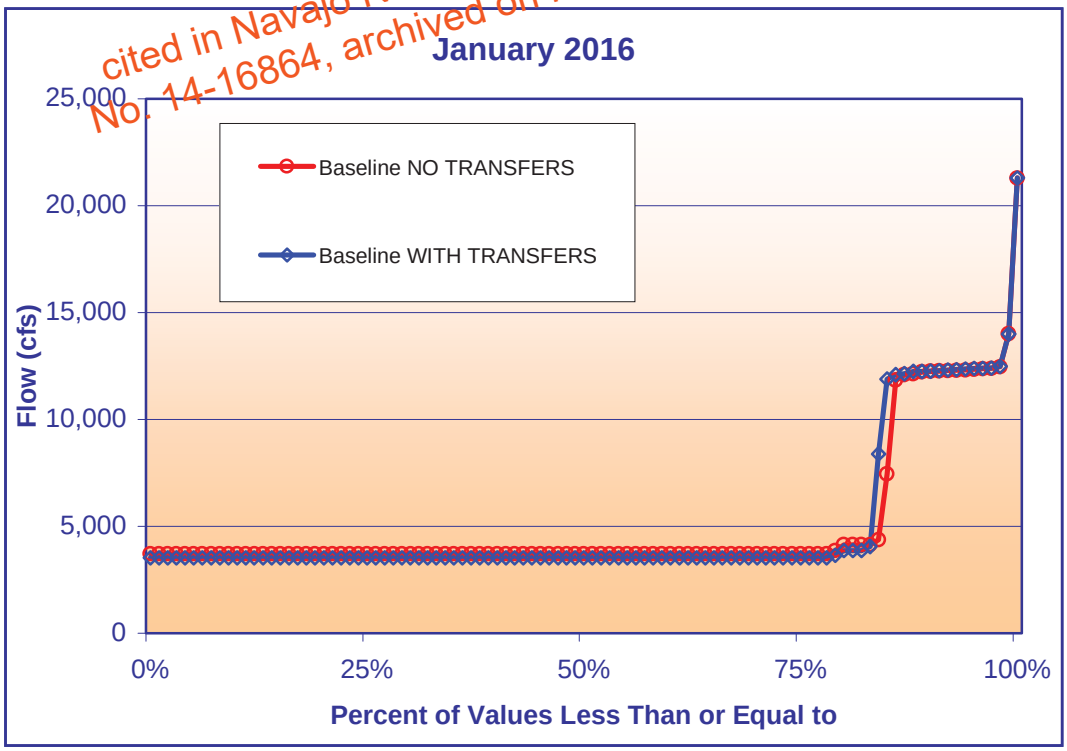
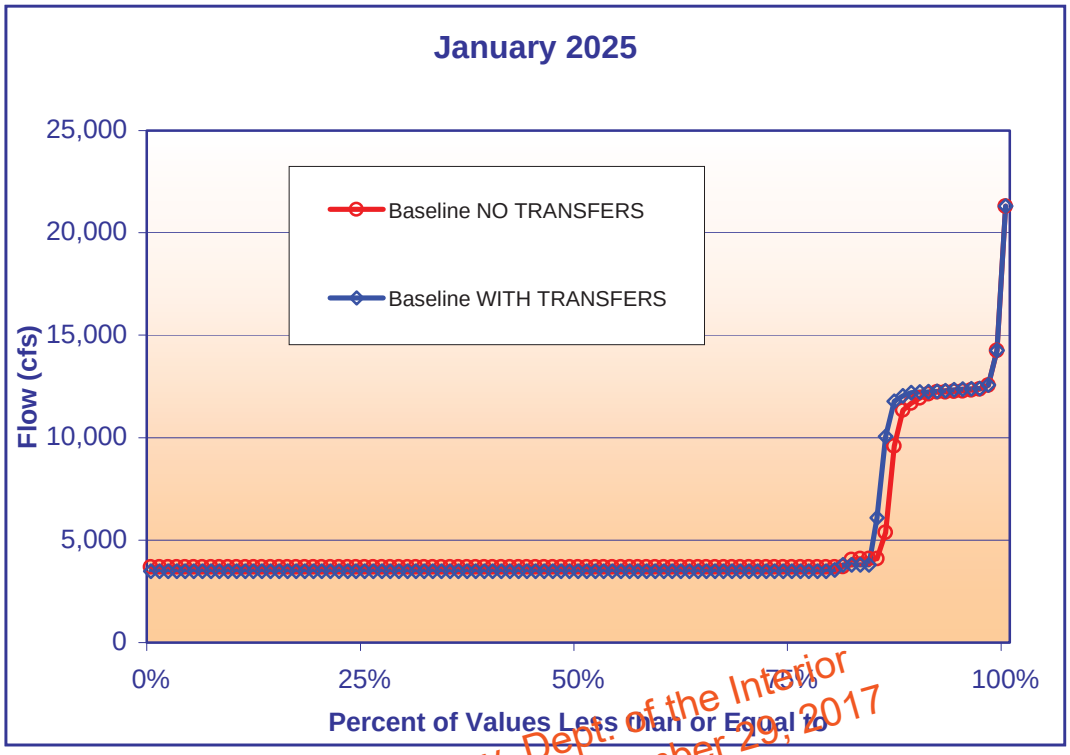


Figure L-13b
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Winter Season Flows as Represented by January Flows
Years 2025 and 2050



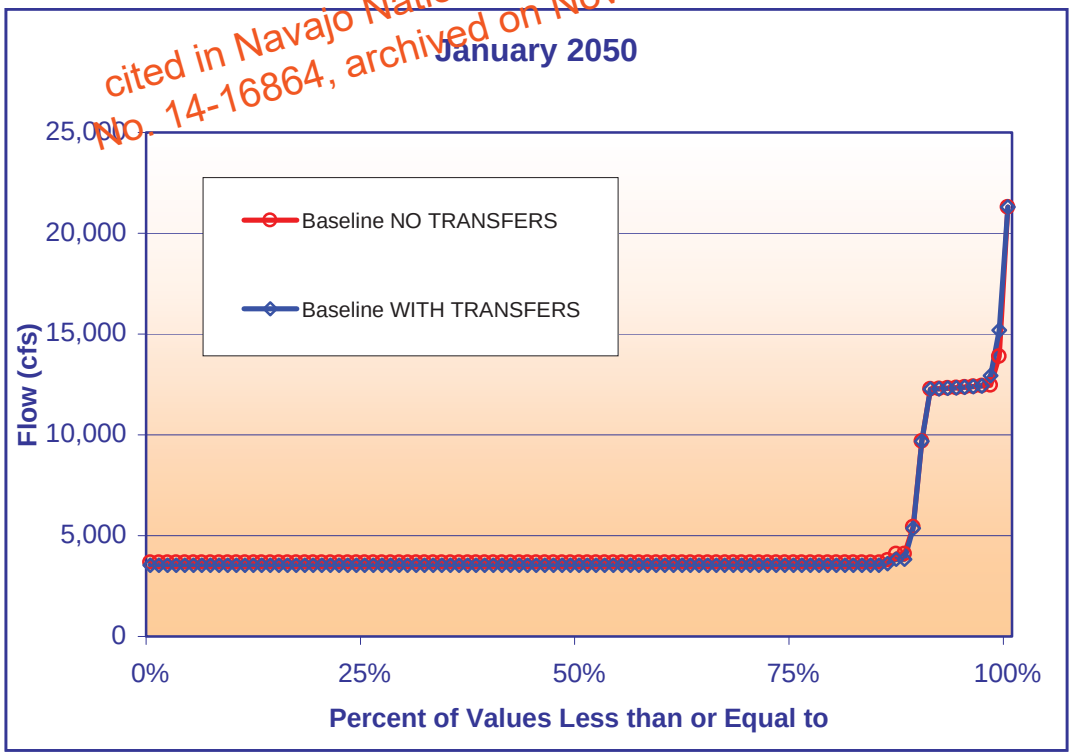
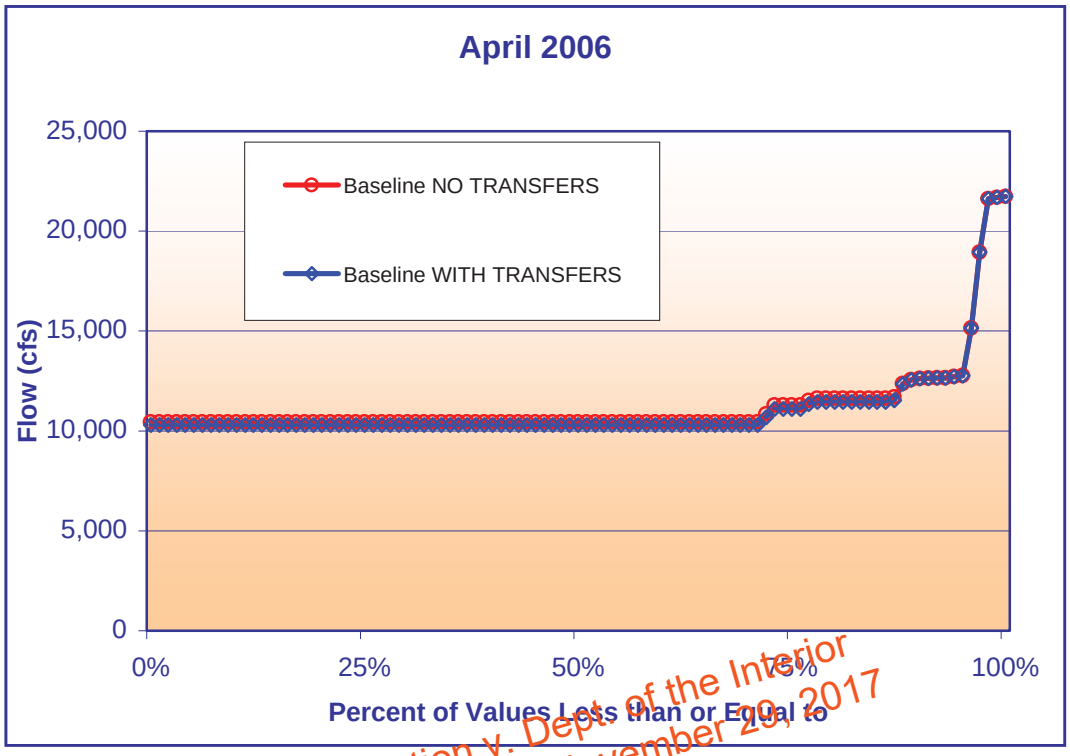


Figure L-14a
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Spring Season Flows as Represented by April Flows
Years 2006 and 2016



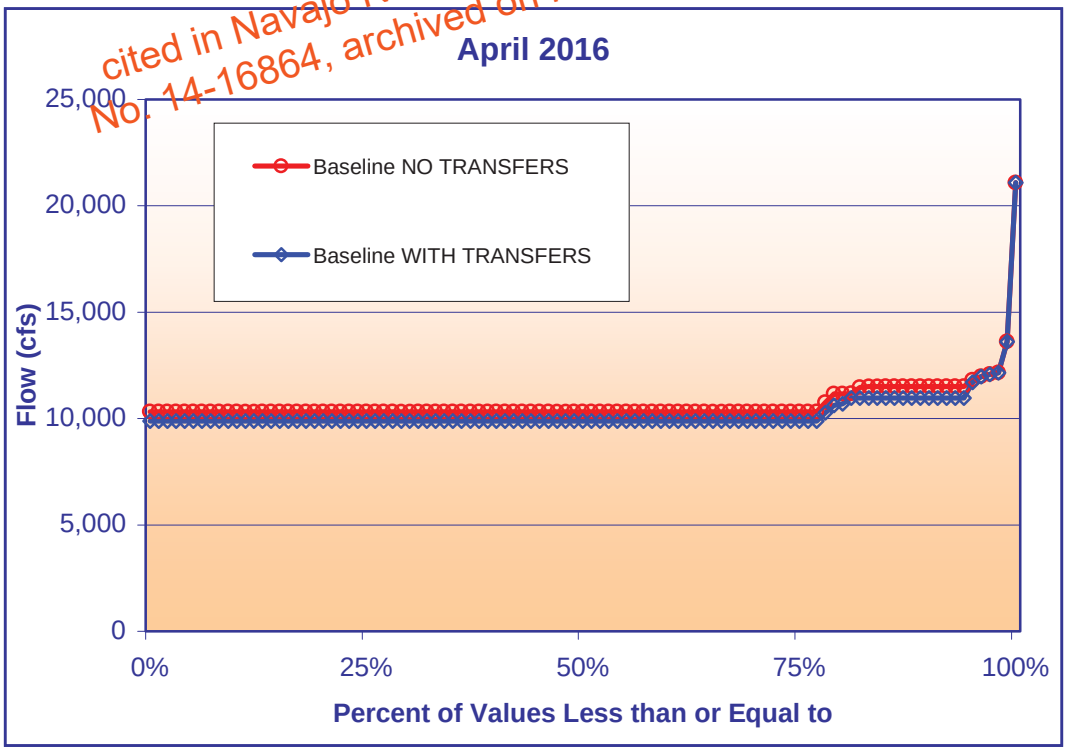
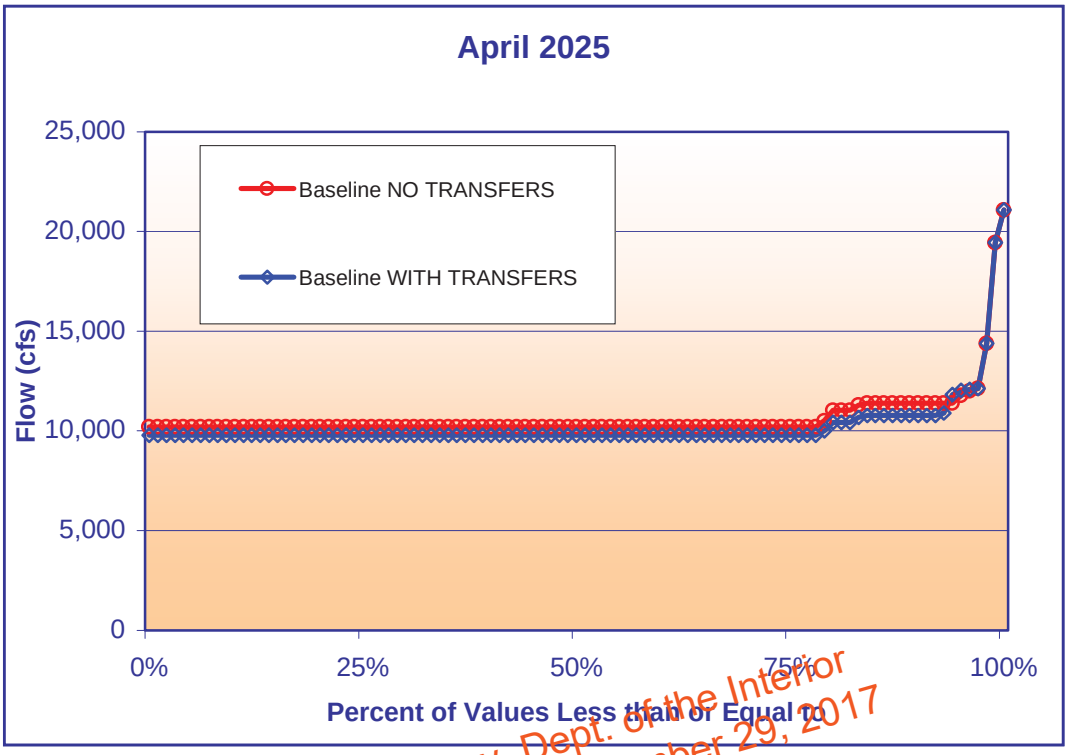


Figure L-14b
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Spring Season Flows as Represented by April Flows
Years 20256 and 2050



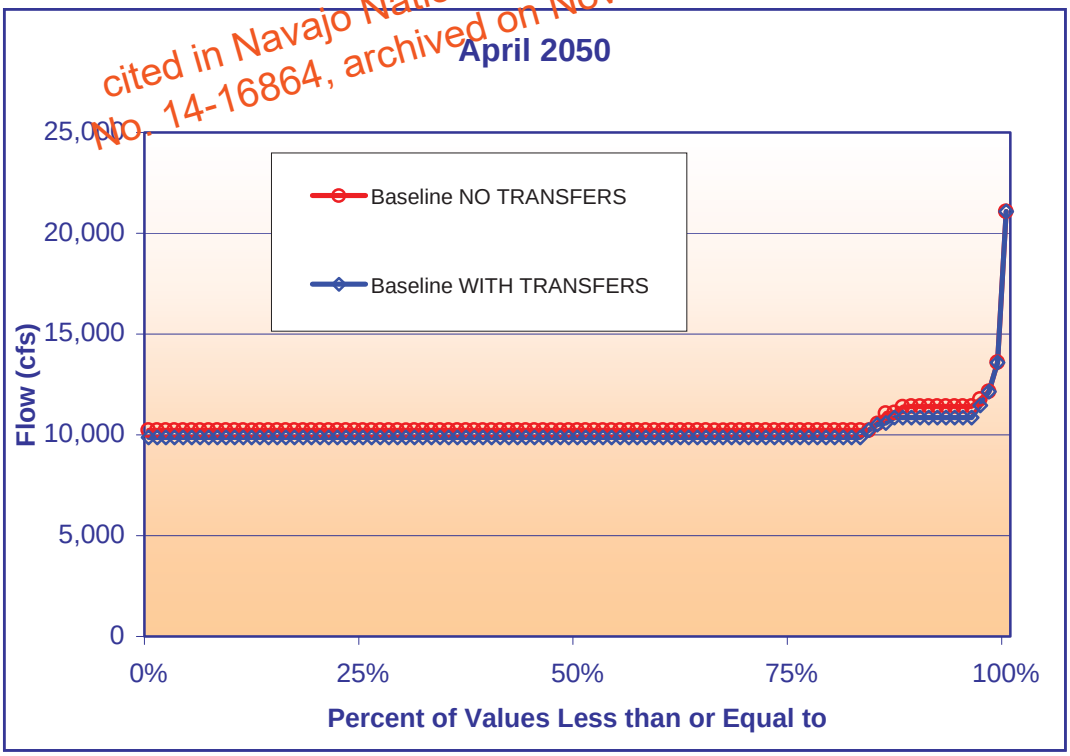
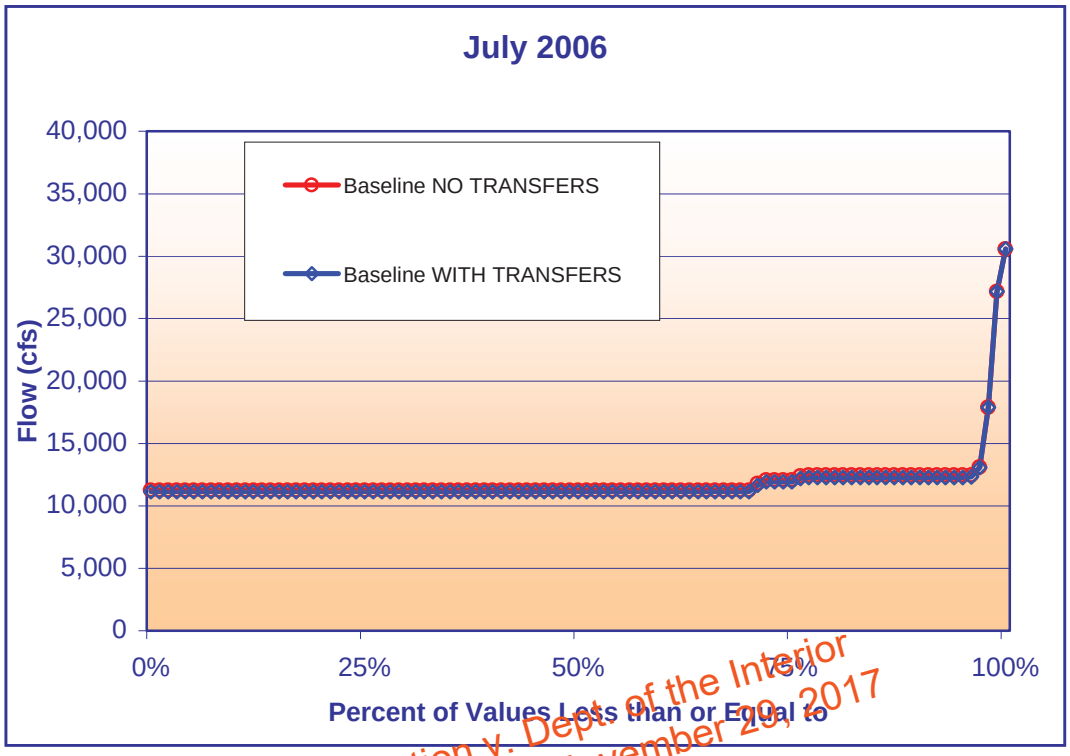


Figure L-15a
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Summer Season Flows as Represented by July Flows
Years 2006 and 2016



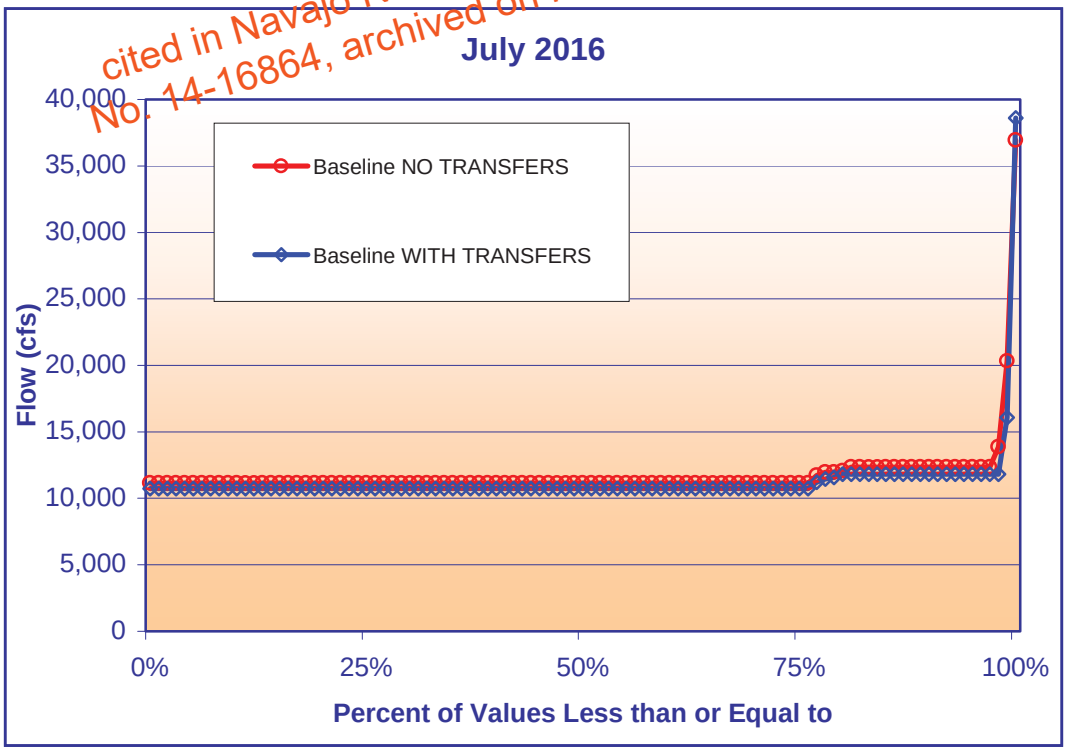
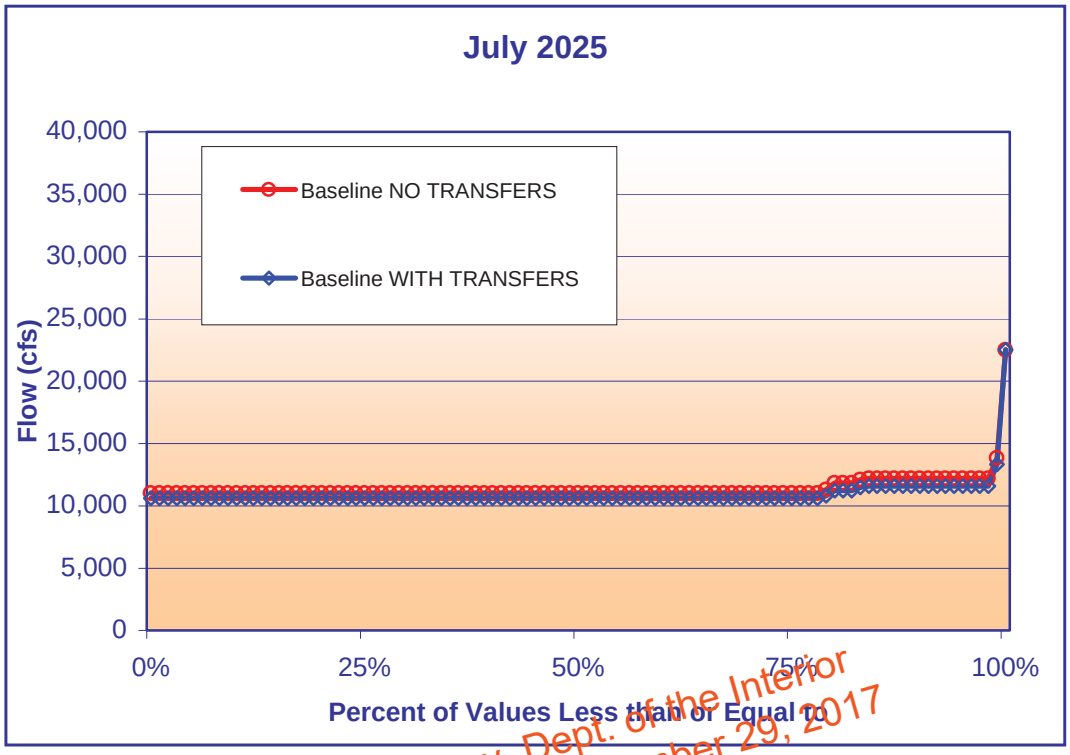


Figure L-15b
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Summer Season Flows as Represented by July Flows
Years 2025 and 2050



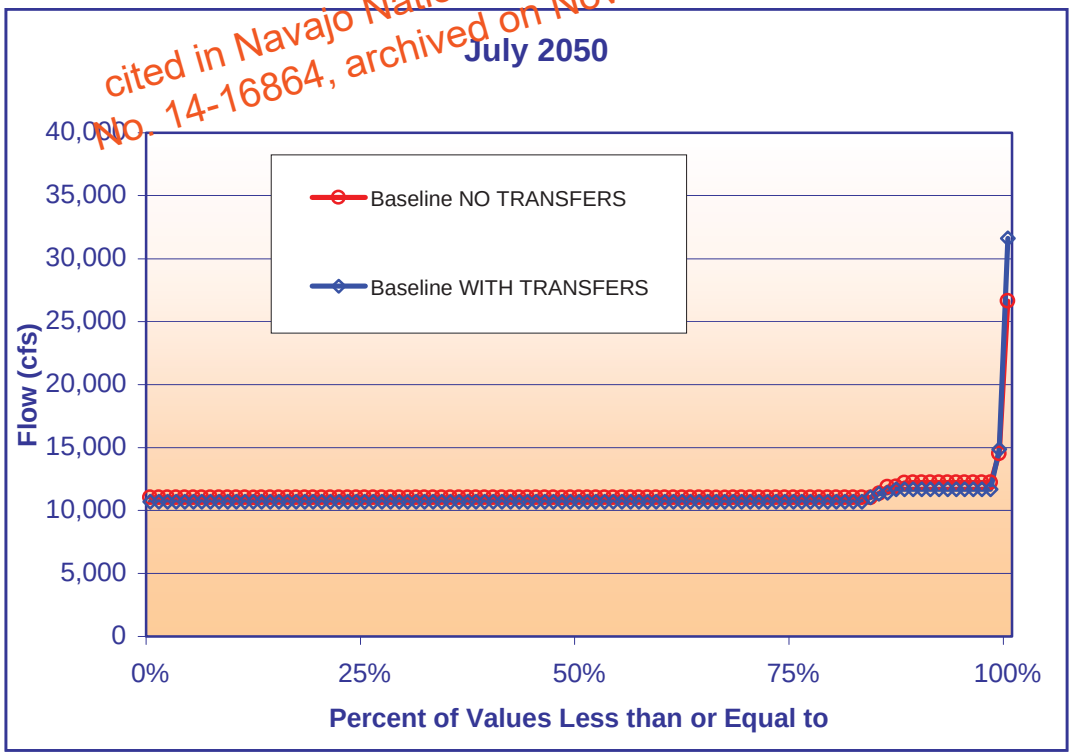
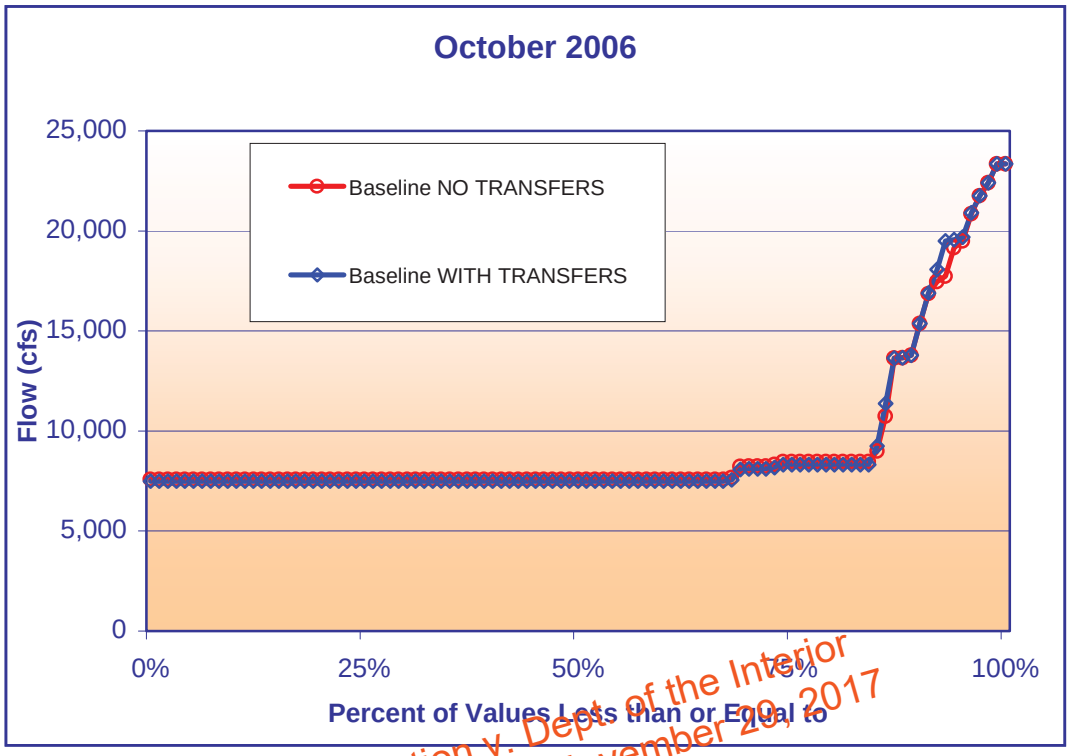


Figure L-16a
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Fall Season Flows as Represented by October Flows
Years 2006 and 2016



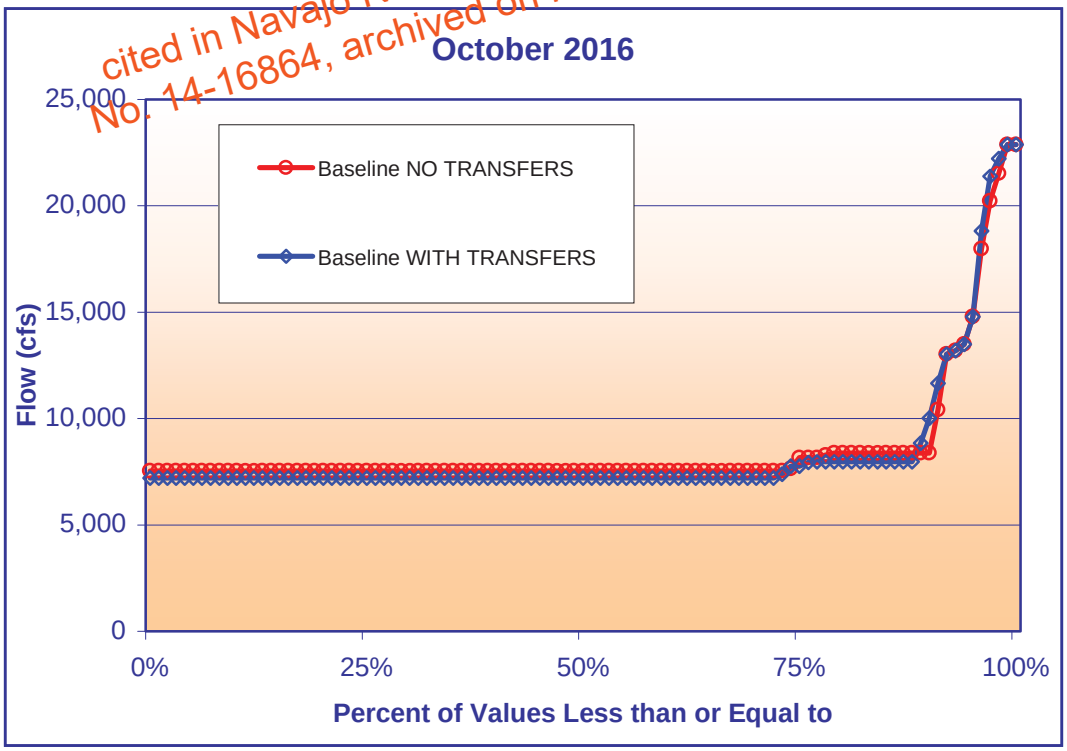
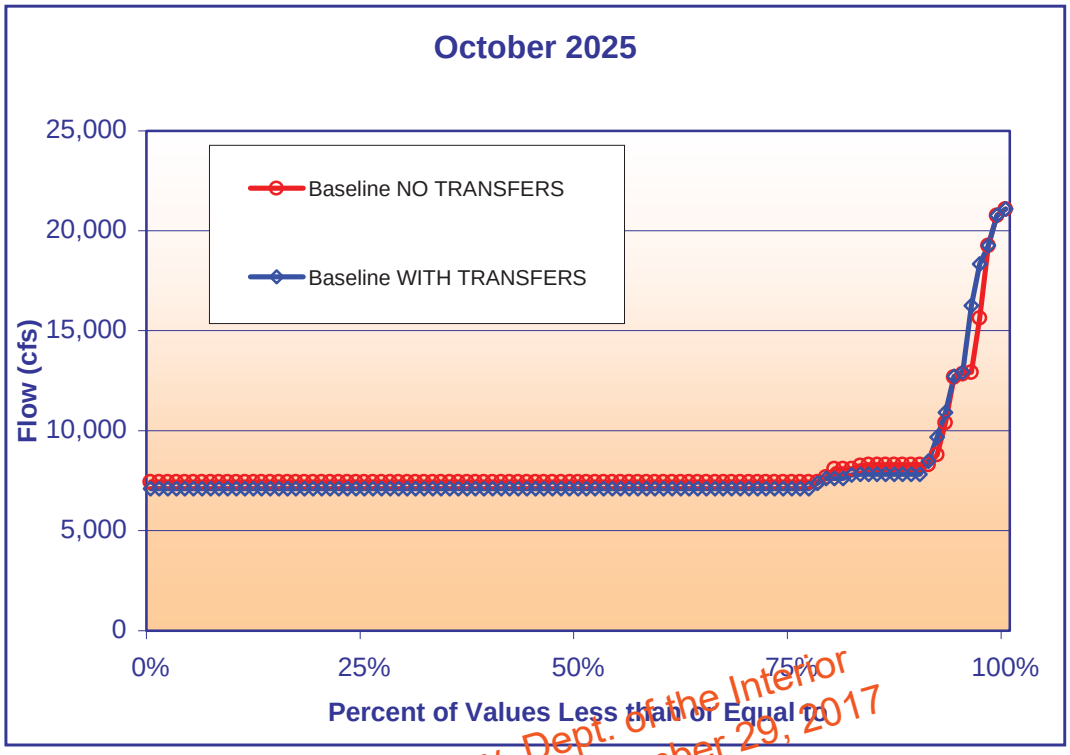
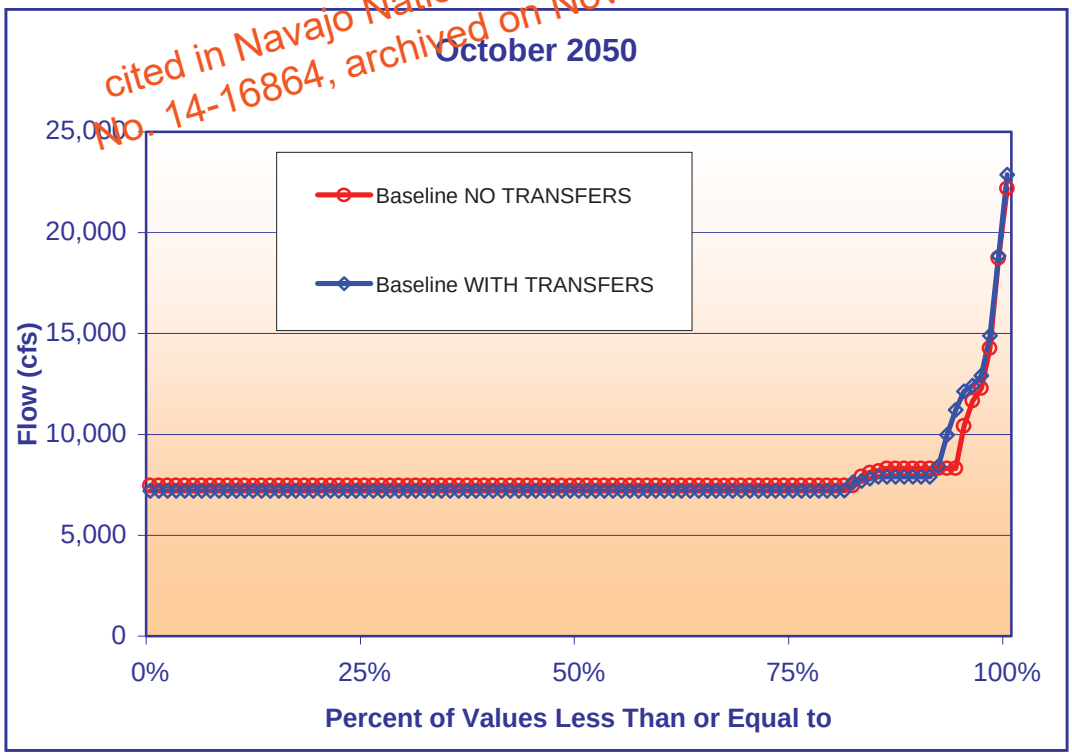


Figure L-16b
Sensitivity Analysis - California Intrastate Water Transfers
Colorado River Flow – Downstream of Palo Verde Diversion Dam
Fall Season Flows as Represented by October Flows
Years 2025 and 2050





ATTACHMENT M

Sensitivity Analysis of Modeled Lake Mead Water Level Protection Assumptions

This attachment illustrates the water surface elevations of Lake Mead and Lake Powell when modeled using a shortage assumption other than was used in the FEIS. In the modeling for the FEIS analysis, it was assumed that the Lake Mead water surface elevation of 1083 feet msl would be protected by determining the existence of a shortage declaration when the operation threatened to draw the water level below 1083. For the sensitivity analysis, the Lake Mead water surface elevation of 1050 feet msl was used as the alternate assumed water level to be protected. The results of the sensitivity analysis are shown by plots of reservoir water levels for Lake Mead and Lake Powell. These plots are to be compared with the plots on the corresponding figures in Section 3.3.

The plots for elevation 1050 protection were produced by the CRSS model configured in the same manner as for the analysis using the Lake Mead water level of 1083 feet msl as a protection level. In both cases an 80 percent probability of protecting the Lake Mead water level was programmed into the model.

Sensitivity Analysis of Shortage Protection Assumptions

Overview

This attachment to the Colorado River Interim Surplus Criteria FEIS presents the results of a sensitivity analysis conducted to assess the effects of using different Lake Mead shortage protection lines in the modeling of the baseline conditions and surplus alternatives. As discussed in Section 3.3.3.4, it was assumed that the Lake Mead water surface elevation of 1083 feet msl would be protected with a certain degree of confidence (approximately 80% of the time). Also, as discussed in Section 3.3.4.1, separate modeling studies were used to determine a "protection line" or trigger such that if Mead's elevation falls below that line, a Level 1 shortage is declared. The actual assurance achieved with respect to the protection of this level (water surface elevation 1083-foot msl) was about 73% through year 2040.

For the sensitivity analysis, the modeling assumptions included a lower protection line (one that would protect Lake Mead water surface elevation of 1050 feet msl approximately 80% of the time). The shortage protection triggers that were used for this purpose are presented graphically in Figure M-1. A graphical comparison of the probability of Lake Mead water surface elevations dropping below 1050 feet msl is presented in Figure M-2. This figure compares the water surface elevations observed under the baseline conditions to those observed under the surplus. As seen in Figure M-2, the level of protection achieved under the baseline conditions was approximately 75% through the year 2040 and then further decreased to 73 percent by 2050.

The sensitivity analysis evaluates the effect that a change to the shortage protection assumptions for the baseline conditions, the Basin States alternative, and the Shortage Protection Alternative would have on the water surface elevations of Lakes Powell and Mead. The relative differences in Lake Powell and Lake Mead water levels between the surplus alternatives and the baseline conditions using the 1050 feet msl Lake Mead water level protection criteria were determined to be similar to those observed under the 1083 feet msl Lake Mead water level protection criteria. There is also little to no difference in the observed Lake Powell water levels under the modeled conditions using the 1083 and 1050 feet msl shortage criteria. However, in general, the 1050 feet msl Lake Mead water level protection criteria provided lower Lake Mead water levels under the baseline conditions and the surplus alternatives.

Lake Mead Water Surface Elevations

Figure M-3 compares the 90^{th,} 50th and 10th Percentile Values of Lake Mead water surface elevations observed under the baseline conditions to that of the surplus alternatives, using the 1050 shortage protection triggers. This figure can be compared to Figure 3.3-13 in Volume I of the FEIS that reflects the same information using the 1083

feet protection criteria. In Figure M-4, a direct comparison of the 90th, 50th, and 10th percentile values of the observed Lake Mead elevations for each shortage assumption is shown for baseline conditions. Figures M-5 and M-6 show the same comparison for the Shortage Protection and Basin States Alternatives, respectively. As noted in these three figures, the 90th percentile values for the three modeled conditions are similar. There are some differences between the 50th percentile values and the 10th percentile values of the three modeled conditions. Generally, the 50th and 10th percentile values are similar during the initial years and then depart. Departures are observed much earlier in time for the Shortage Protection Alternative (Figure M-6), then the Basin States Alternative (Figure M-5) and finally the baseline conditions (Figure M-4). Lower lake water levels are observed for the modeled conditions that use the 1050 feet msl shortage protection criteria. This is attributable to the more liberal modeled criteria that allows the lake to be drawn down to lower levels before the shortage triggers kick-in and water delivery reductions begin.

Summaries of the observed differences in Lake Mead water levels are presented in Tables M-1, M-2 and M-3.

Table M-1
Lake Mead Water Surface Elevations
90th, 50th and 10th Percentile Values for Baseline Conditions
Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)

	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	1.65	14.73	12.80
Minimum Departure	-0.62	0.00	0.00
Average Departure	0.06	5.45	4.60

Table M-2
Lake Mead Water Surface Elevations
90th, 50th and 10th Percentile Values for Basin States Alternative
Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)

	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	1.62	14.84	12.96
Minimum Departure	-0.64	0.00	0.00
Average Departure	0.10	5.92	5.15

Table M-3 Lake Mead Water Surface Elevations 90th, 50th and 10th Percentile Values for Shortage Protection Alternative Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)			
	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	3.36	23.56	26.22
Minimum Departure	-1.84	0.00	0.00
Average Departure	0.23	9.21	9.72

Lake Powell Water Surface Elevations

Figure M-7 compares the 90th, 50th and 10th percentile Lake Powell water surface elevations observed under the baseline conditions and all of the surplus alternatives, using the 1050 shortage protection triggers. This figure can be compared to Figure 3.3-6 in Volume I of the FEIS that reflects the same information using the 1083 feet protection criteria. In Figure M-8, a direct comparison of the 90th, 50th, and 10th percentile Lake Powell elevations for each shortage protection assumption is shown for baseline conditions. Figures M-9 and M-10 show the same comparison for the Shortage Protection and Basin States Alternatives respectively. As shown in Figures M-8, M-9 and M-10, differences observed under the baseline, Basin States Alternative and Shortage Protection Alternative are minimum and considered to be insignificant. This indicates that the use of different Lake Mead shortage protection criteria has very little to no impact on Lake Powell water surface elevations.

Summaries of the observed differences in Lake Powell water levels are presented in Tables M-4, M-5 and M-6.

Table M-4 Lake Powell Water Surface Elevations 90th, 50th and 10th Percentile Values for Baseline Conditions Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)			
	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	0.48	0.00	0.00
Minimum Departure	-0.13	0.00	0.00
Average Departure	0.02	0.00	0.00

Table M-5 Lake Powell Water Surface Elevations 90th, 50th and 10th Percentile Values for Basin States Alternative Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)			
	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	0.20	0.00	0.00
Minimum Departure	-0.13	0.00	0.00
Average Departure	0.01	0.00	0.00

Table M-6 Lake Powell Water Surface Elevations 90th, 50th and 10th Percentile Values for Shortage Protection Alternative Comparison of Lake Mead Shortage Protection Criteria (1083 to 1050)			
	Departures (49-year Period)		
	90th Percentile Values	50th Percentile Values	10th Percentile Values
Maximum Departure	0.25	2.78	5.37
Minimum Departure	-0.02	0.00	0.00
Average Departure	0.03	0.33	1.68

List of Figures	
M-1	Lake Mead Level 1 Shortage Triggers
M-2	Lake Mead Water Surface Elevations Comparison of Surplus Alternatives to Baseline Percent of Values Greater Than or Equal to 1050 feet (80P-1050)
M-3	Lake Mead End-of-December Water Elevations Comparison of Surplus Alternatives to Baseline for 1050 Shortage Protection 90th, 50th, and 10th Percentile Values
M-4	Lake Mead End-of-December Water Elevations Comparison of Shortage Assumptions for Baseline Conditions 90th, 50th, and 10th Percentile Values
M-5	Lake Mead End-of-December Water Elevations Comparison of Shortage Assumptions for Basin States Alternative 90th, 50th, and 10th Percentile Values
M-6	Lake Mead End-of-December Water Elevations Comparison of Shortage Assumptions for Shortage Protection Alternative 90th, 50th, and 10th Percentile Values
M-7	Lake Powell End-of-July Water Elevations Comparison of Surplus Alternatives and Baseline for 1050 Shortage Protection
M-8	Lake Powell End-of-July Water Elevations Comparison of Shortage Assumptions for Baseline Conditions 90th, 50th, and 10th Percentile Values
M-9	Lake Powell End-of-July Water Elevations Comparison of Shortage Assumptions for Basin States Alternative 90th, 50th, and 10th Percentile Values
M-10	Lake Powell End-of-July Water Elevations Comparison of Shortage Assumptions for Shortage Protection Alternative 90th, 50th, and 10th Percentile Values

Figure M-1
Lake Mead Level 1 Shortage Triggers Assumed for Modeling

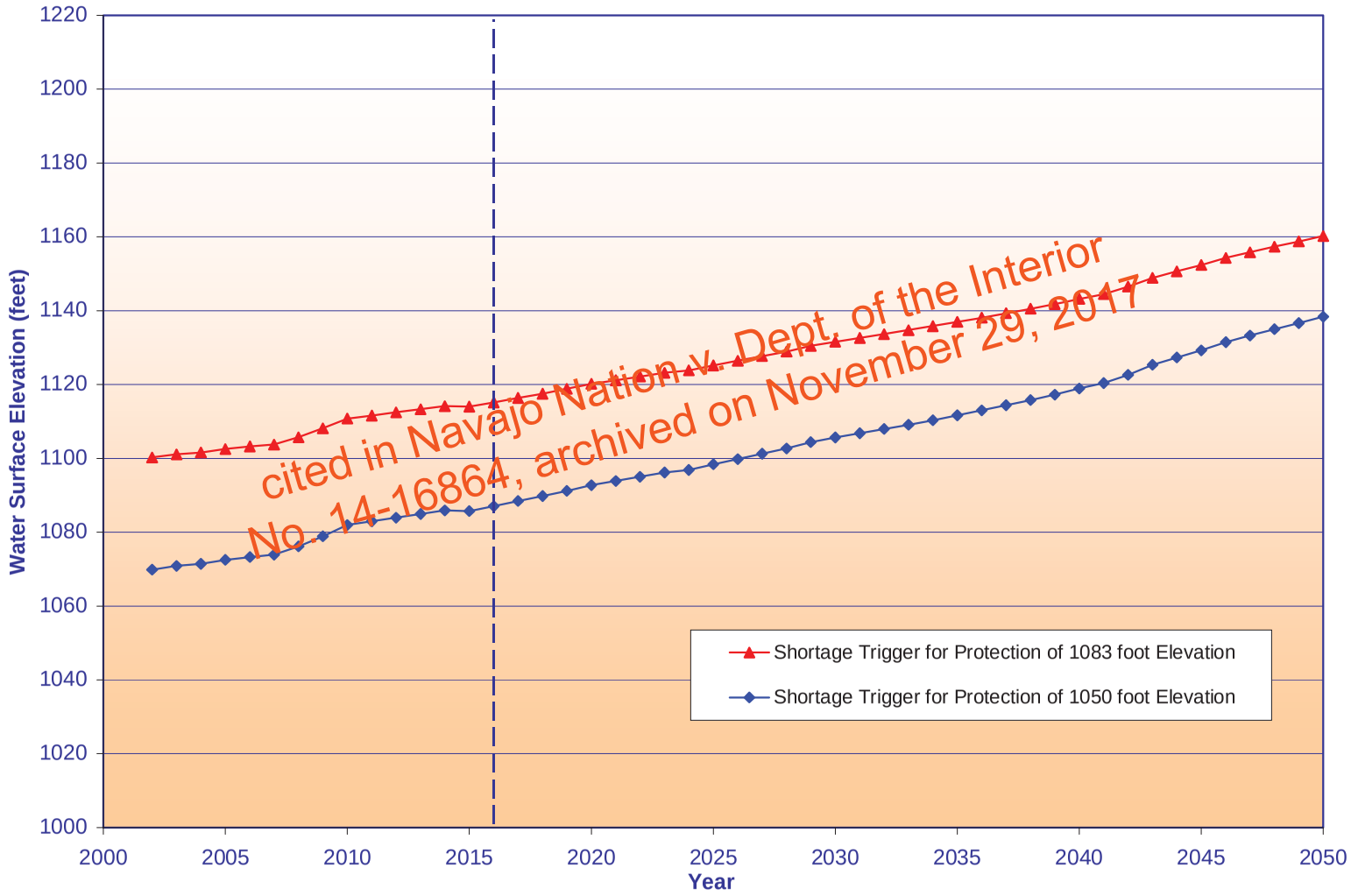


Figure M-2
Lake Mead Water Surface Elevations
Comparison of Surplus Alternatives to Baseline
Percent of Values Greater than or Equal to 1050 (80P-1050)

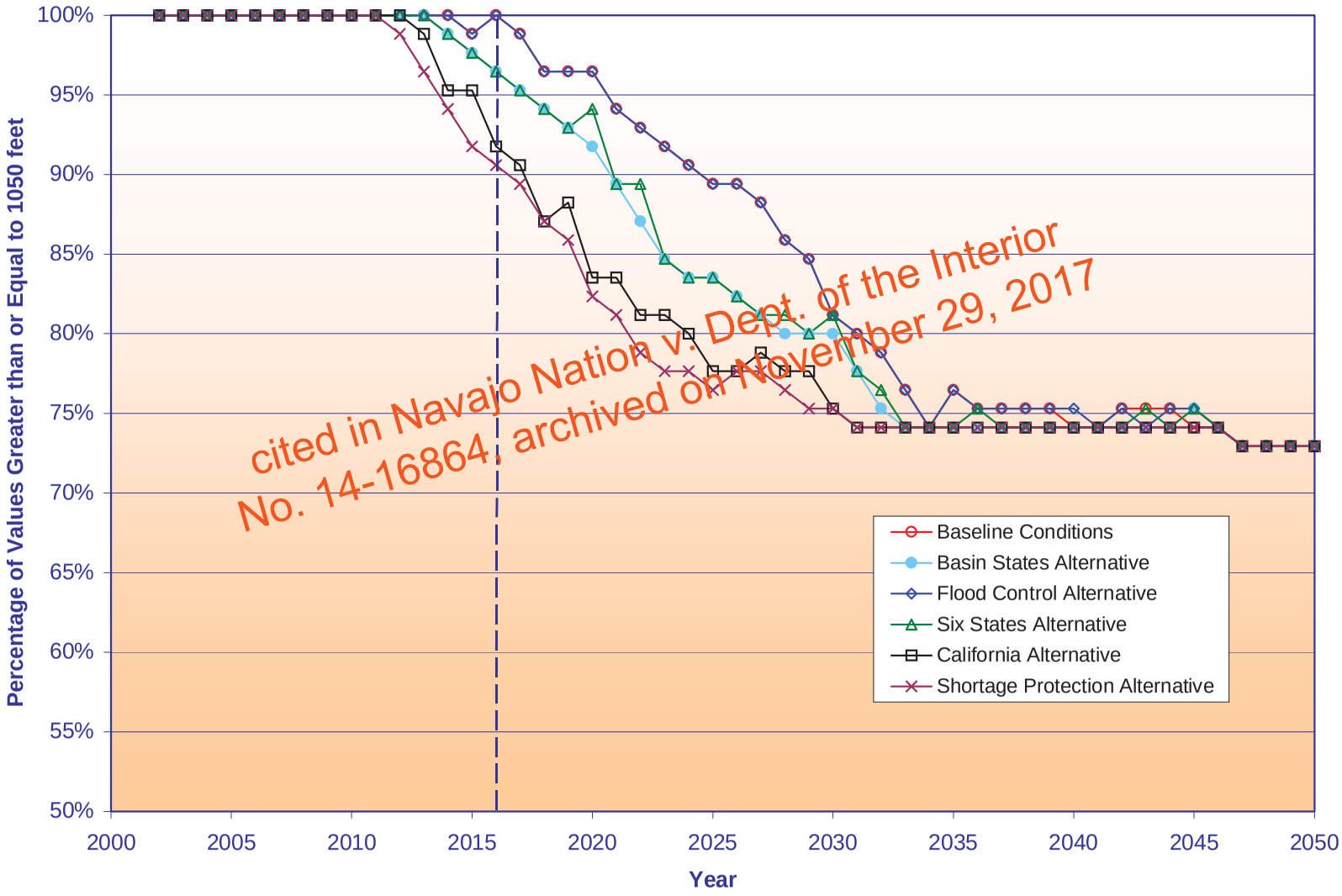


Figure M-3
Lake Mead End-of-December Water Elevations
Comparison of Surplus Alternatives to Baseline for 1050 Shortage Protection
90th, 50th, and 10th Percentile Values

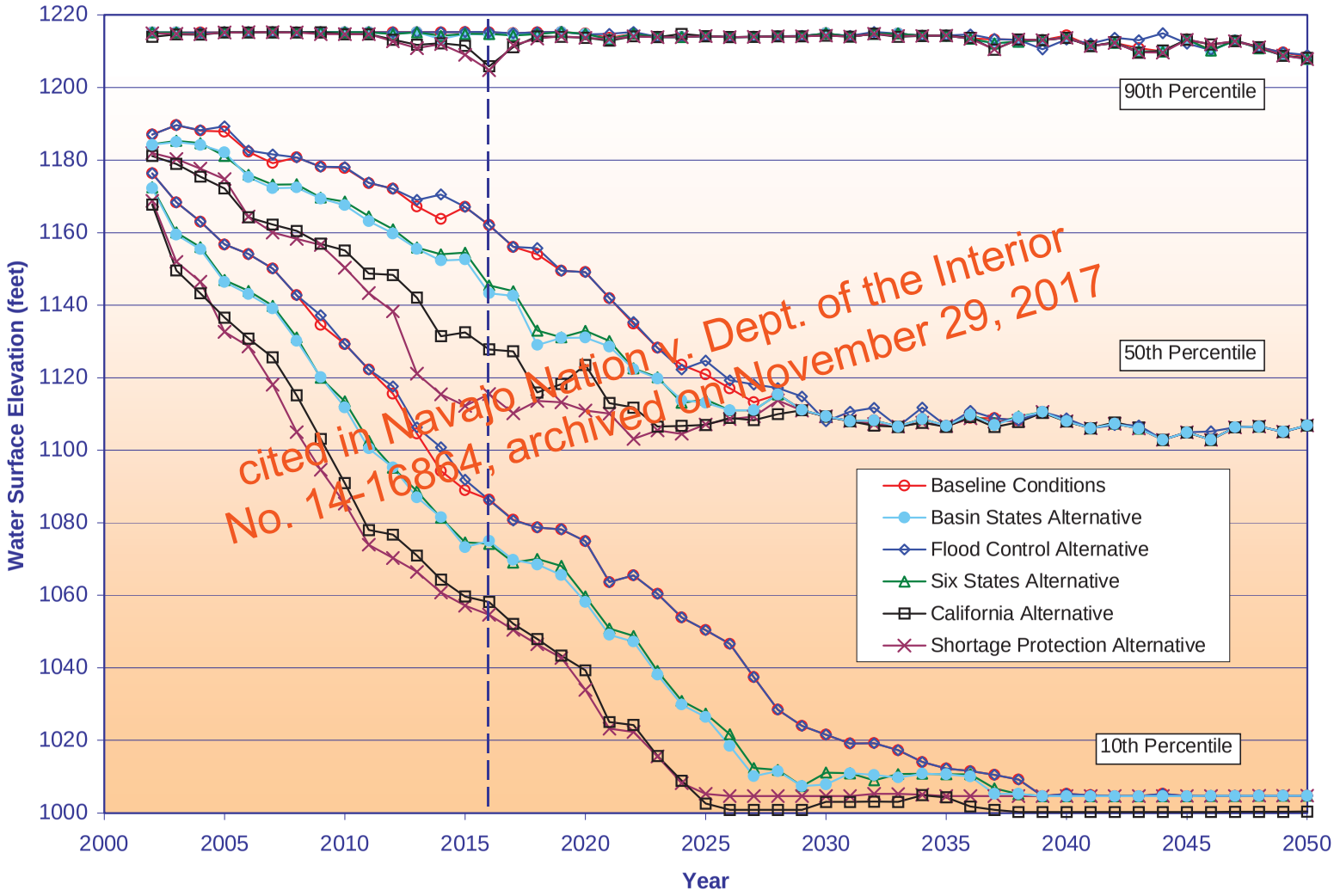


Figure M-4
Lake Mead End-of-December Water Elevations
Comparison of Shortage Assumptions for Baseline Conditions
90th, 50th, and 10th Percentile Values

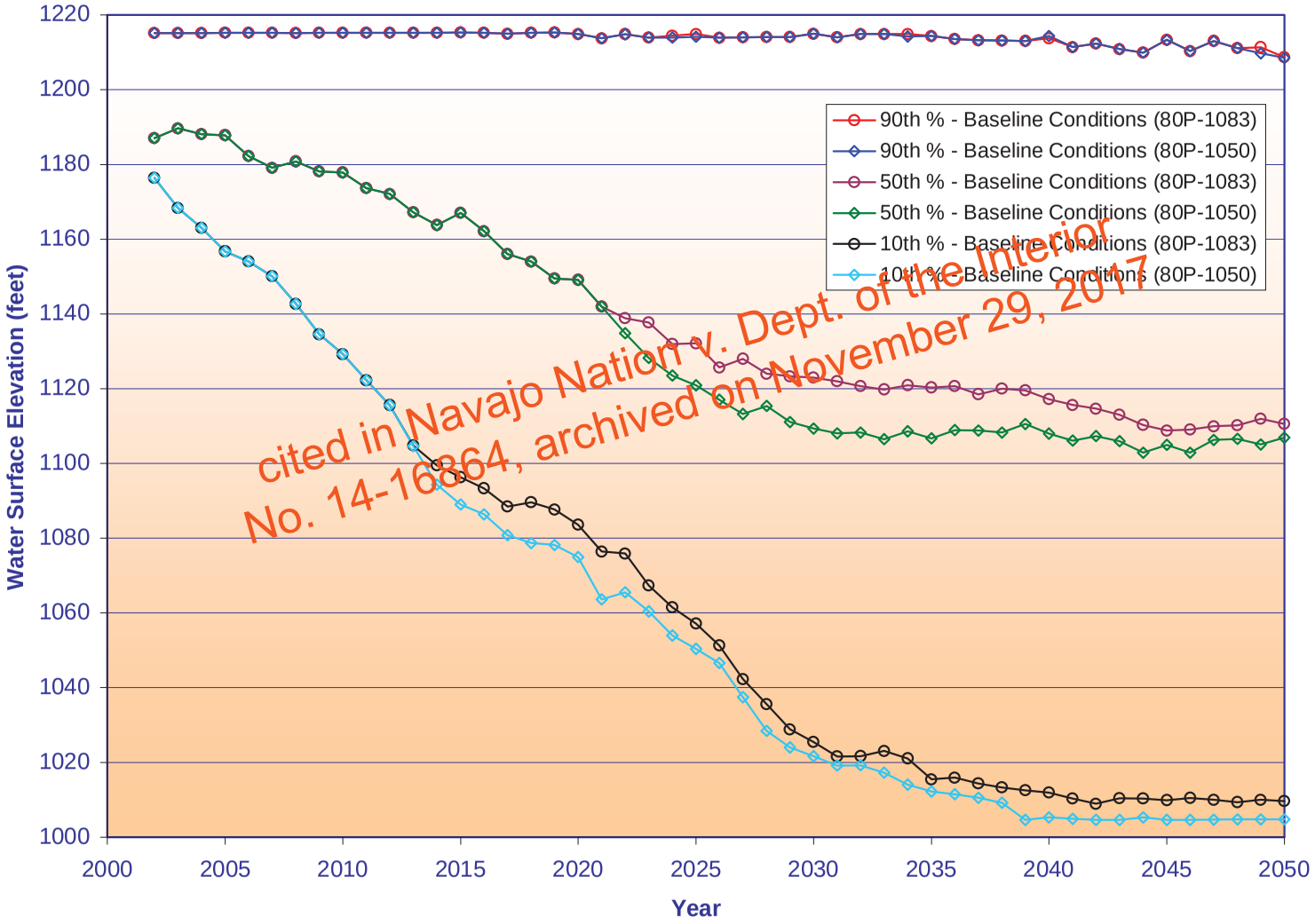


Figure M-5
Lake Mead End-of-December Water Elevations
Comparison of Shortage Assumptions for Basin States Alternative
90th, 50th, and 10th Percentile Values

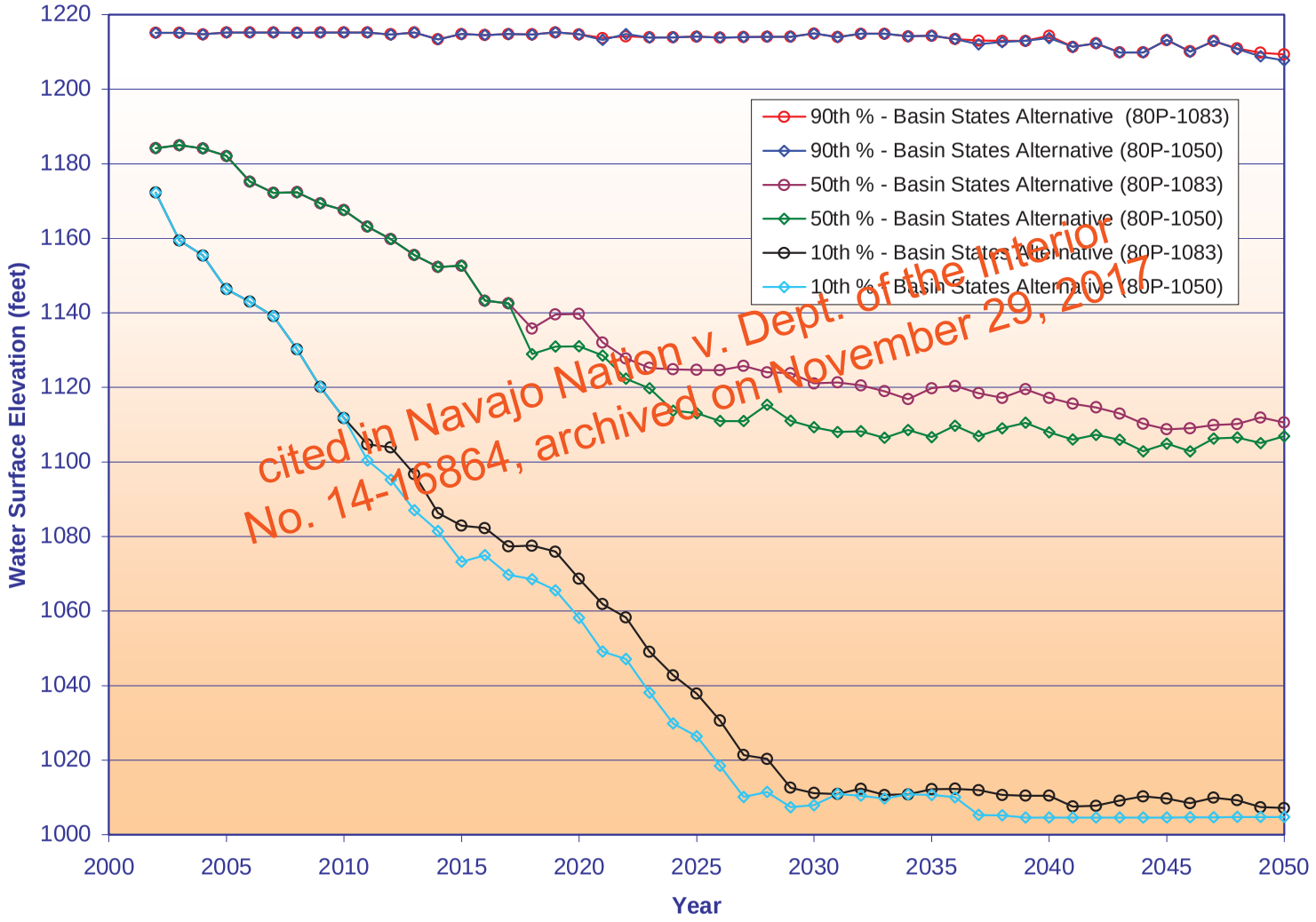


Figure M-6
Lake Mead End-of-December Water Elevations
Comparison of Shortage Assumptions for Shortage Protection Alternative
90th, 50th, and 10th Percentile Values

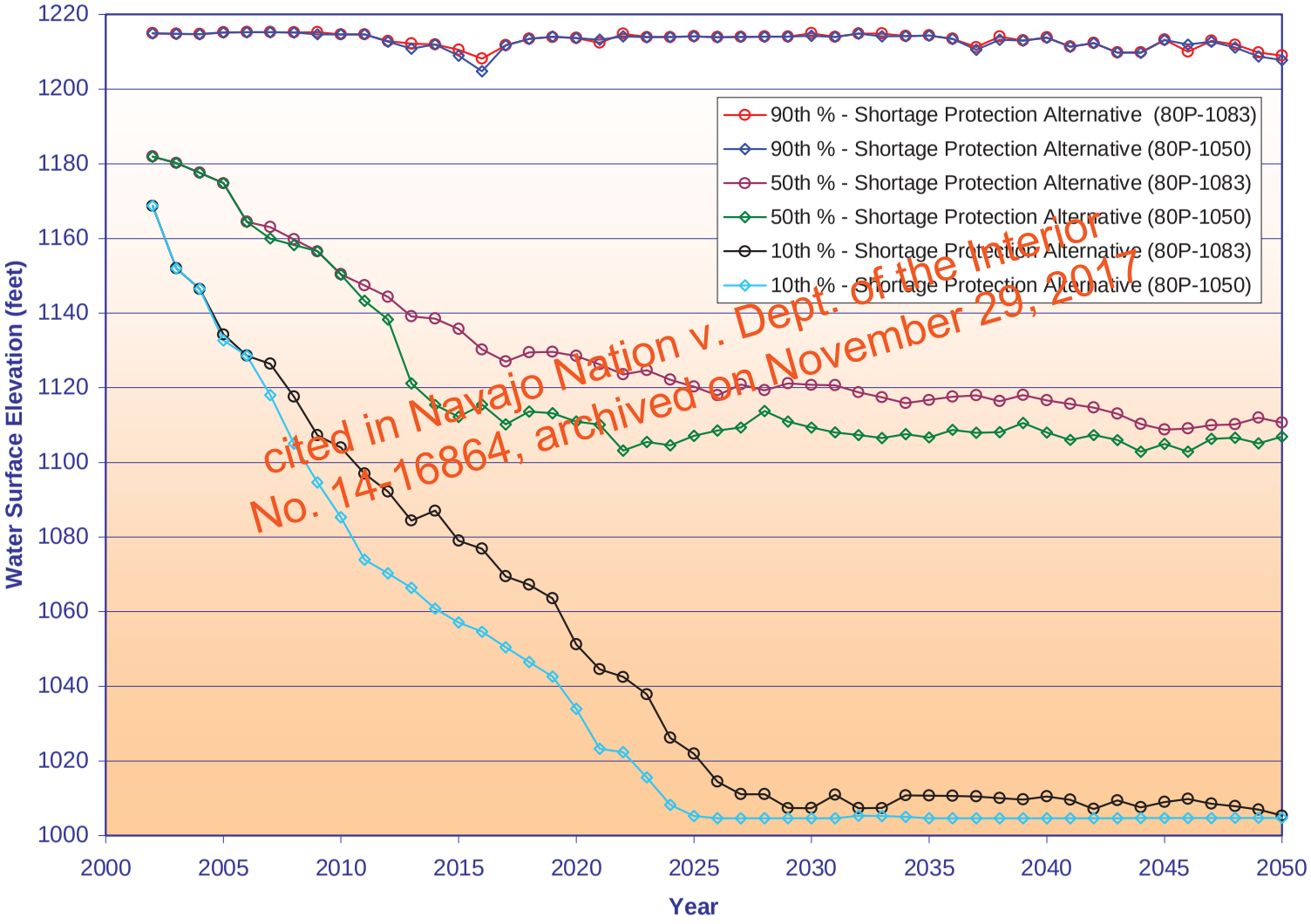


Figure M-7
Lake Powell End-of-July Water Elevations
Comparison of Surplus Alternatives and Baseline for 1050 Shortage Protection
90th, 50th, and 10th Percentile Values

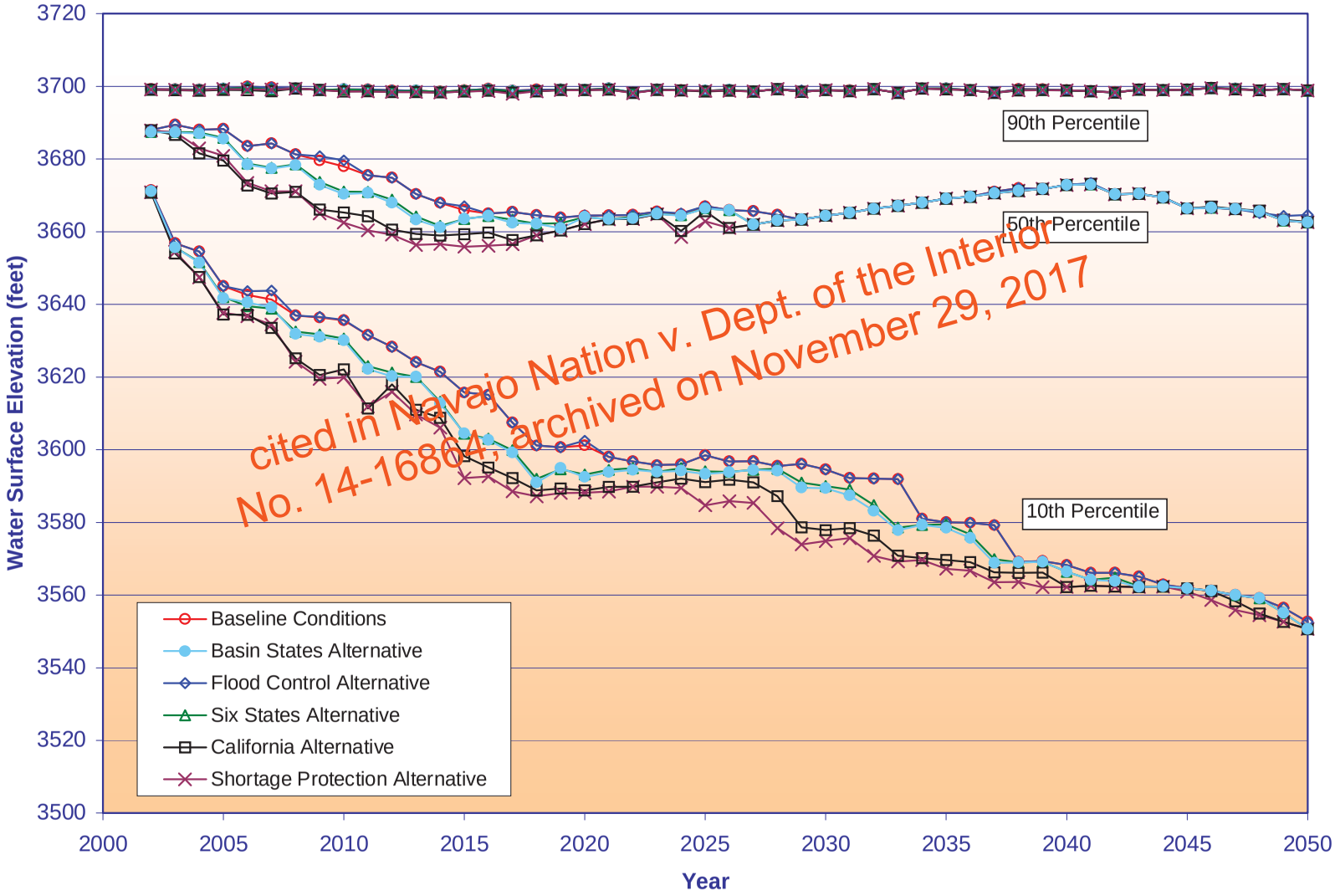


Figure M-8
Lake Powell End-of-July Water Elevations
Comparison of Shortage Assumptions for Baseline Conditions
90th, 50th, and 10th Percentile Values

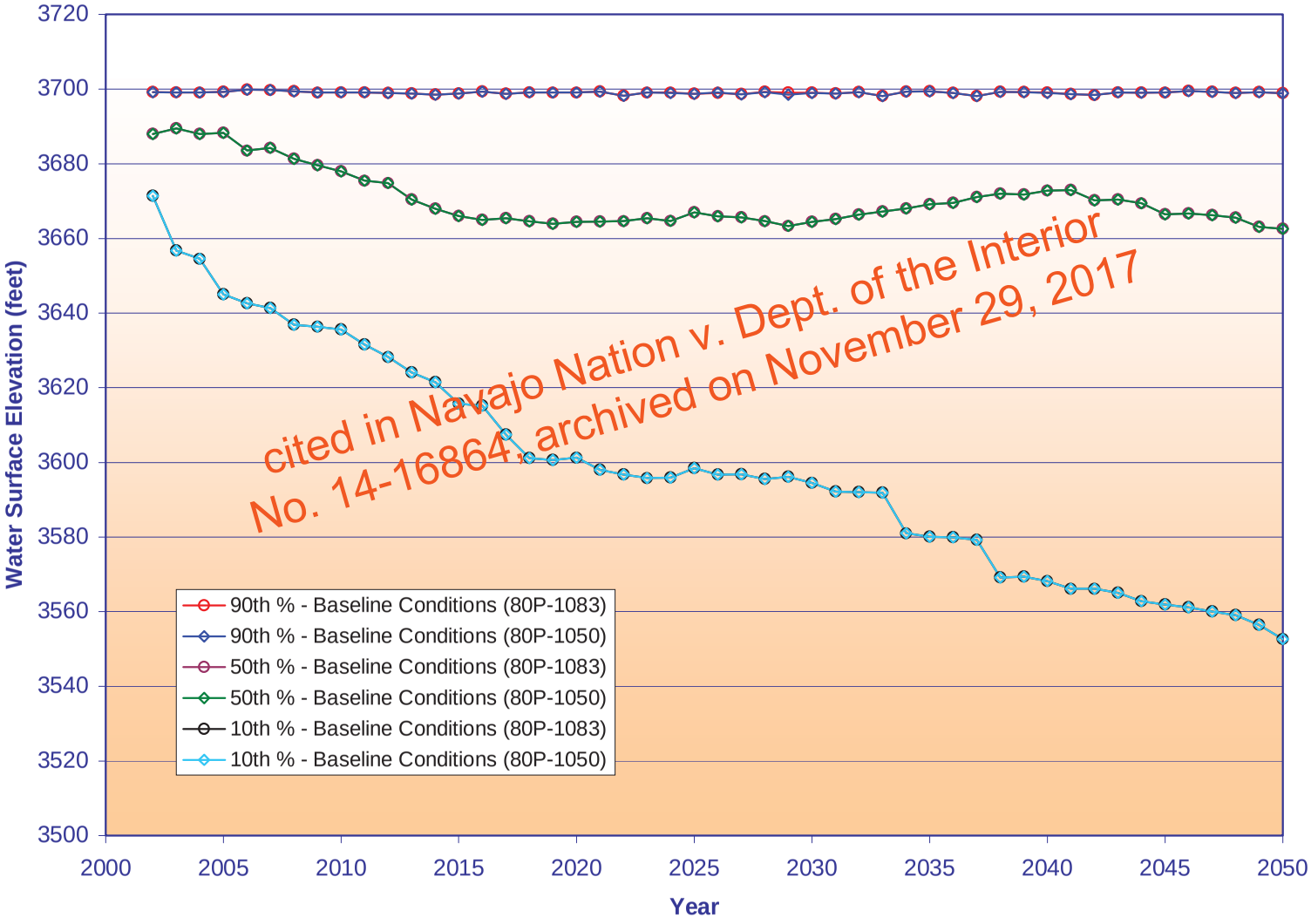


Figure M-9
Lake Powell End-of-July Water Elevations
Comparison of Shortage Assumptions for Basin States Alternative
90th, 50th, and 10th Percentile Values

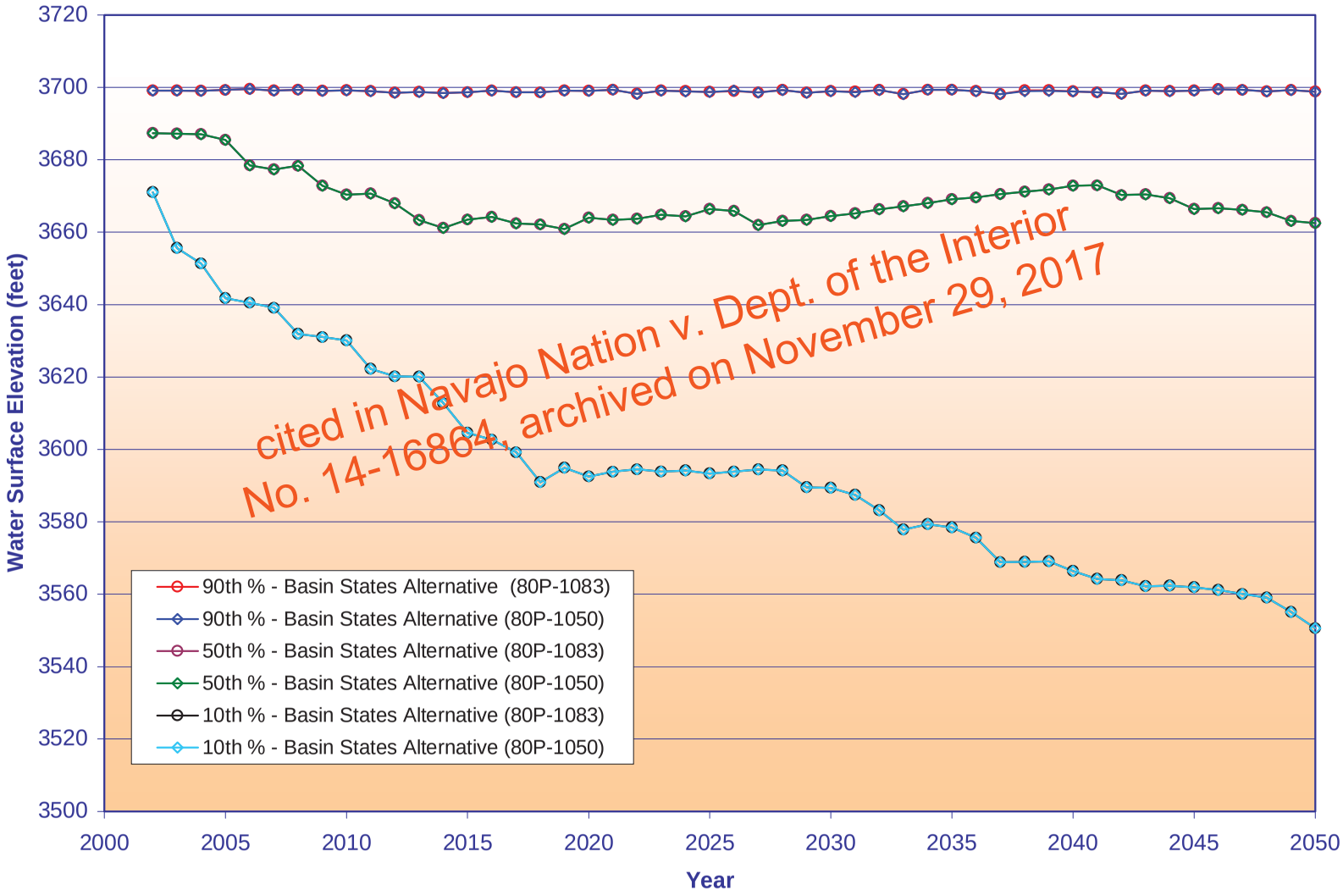
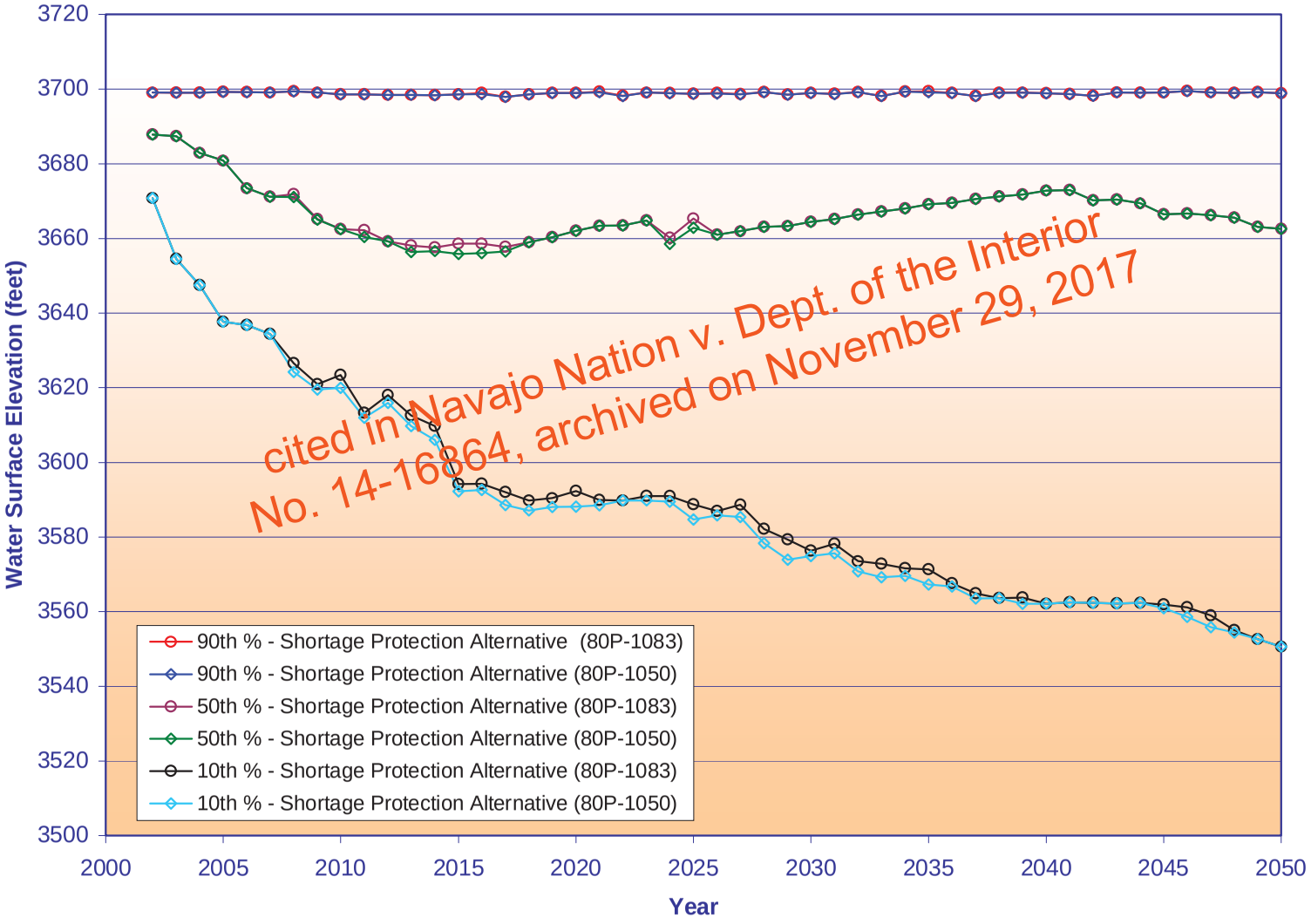


Figure M-10
Lake Powell End-of-July Water Elevations
Comparison of Shortage Assumptions for Shortage Protection Alternative
90th, 50th, and 10th Percentile Values



ATTACHMENT N

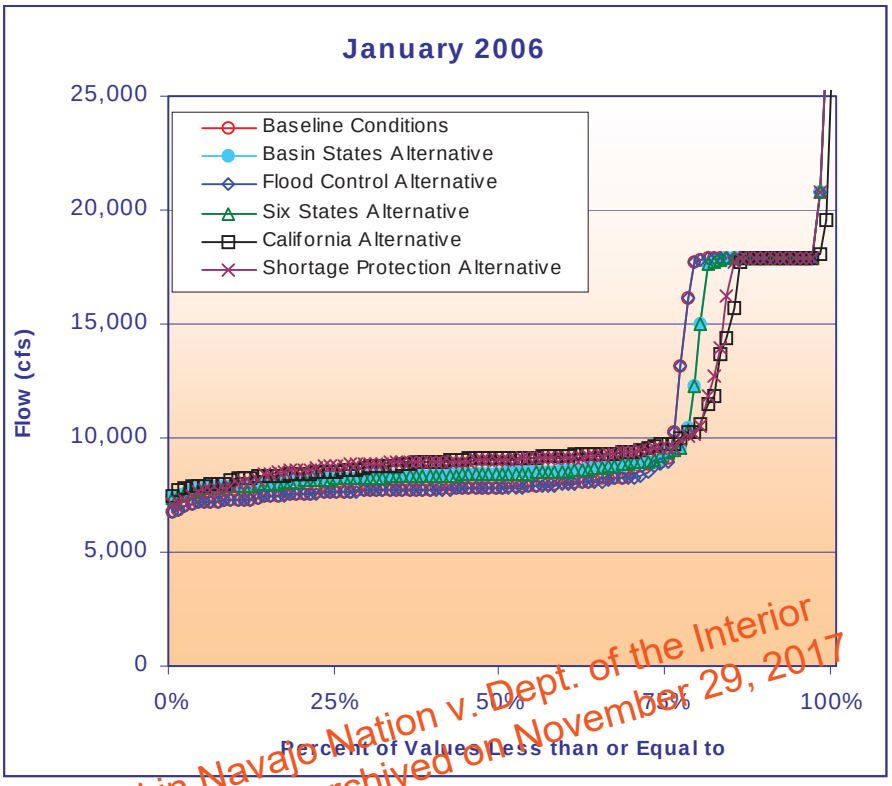
Comparison of Colorado River Flows

This attachment presents a comparison of seasonal Colorado River flows between the baseline conditions and the alternatives. The comparison is made by means of a group of plots for each of four stations along the river. Each group corresponds to a single modeled flow measurement location on the river and each figure within a group corresponds to one of the four seasons. Each of the seasonal figures is further divided into four sub-figures. Each sub-figure deals with a separate modeled year. Data describing Colorado River flow is presented in this manner for the following locations: downstream of the Havasu National Wildlife Refuge diversion; upstream of the Colorado River Indian Reservation diversion; downstream of the Palo Verde Irrigation District diversion; and below Mexico's diversion at Morelos Dam.

Index of Flow Data Plots

Figures	Station
N-1a through N-4b	Havasu NWR
N-5a through N-8b	Colorado River Indian Reservation
N-9a through N-12b	Palo Verde Diversion Dam
N-13a through N-16b	Mexico Diversion at Morelos Dam

Figure N-1a
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



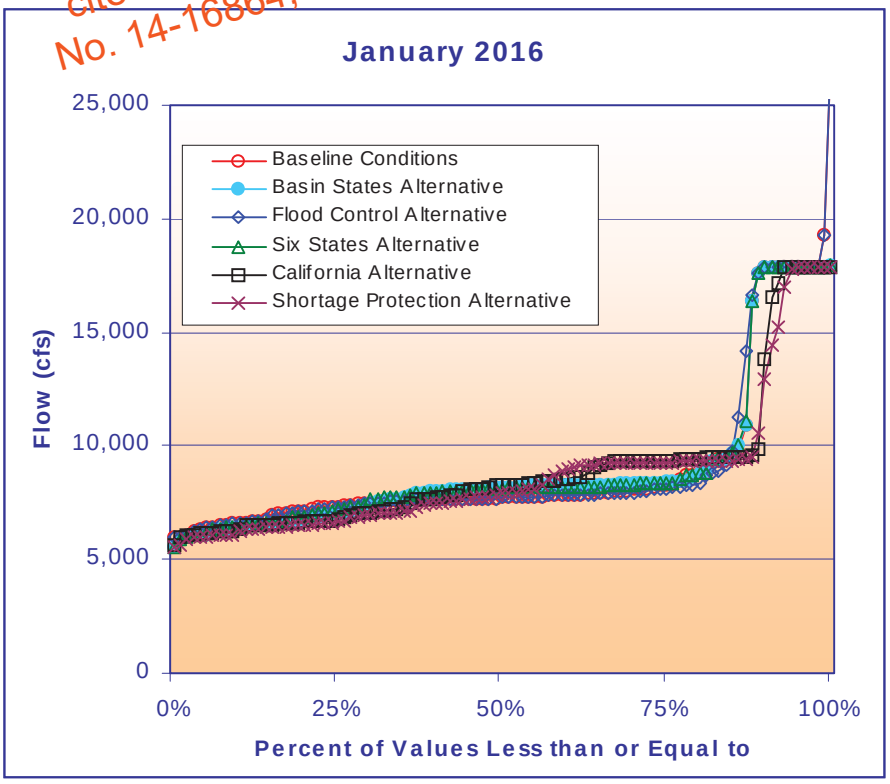
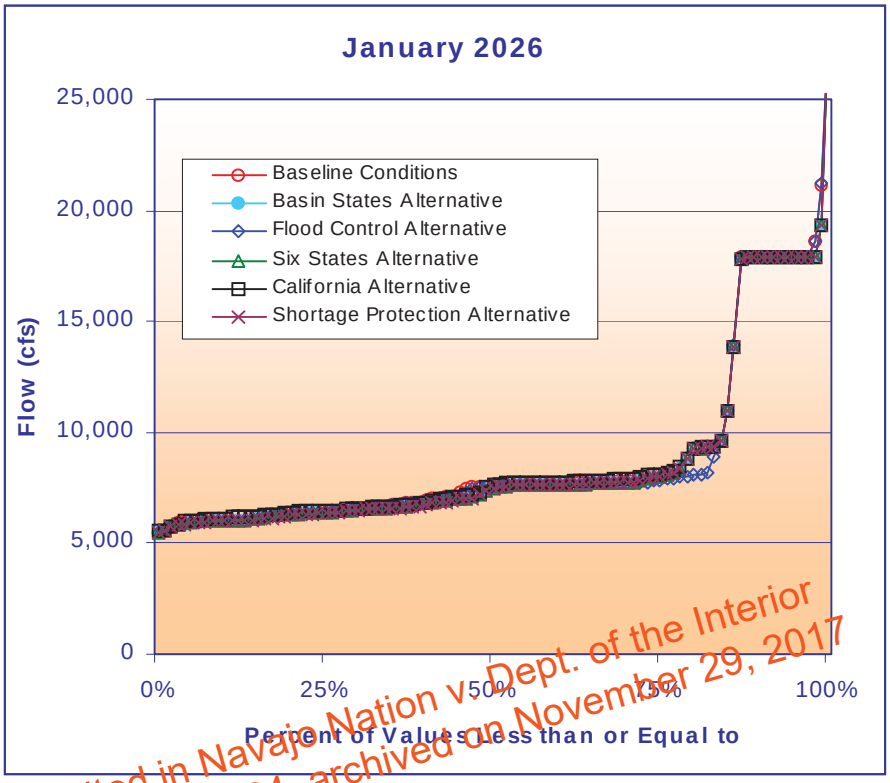


Figure N-1b
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



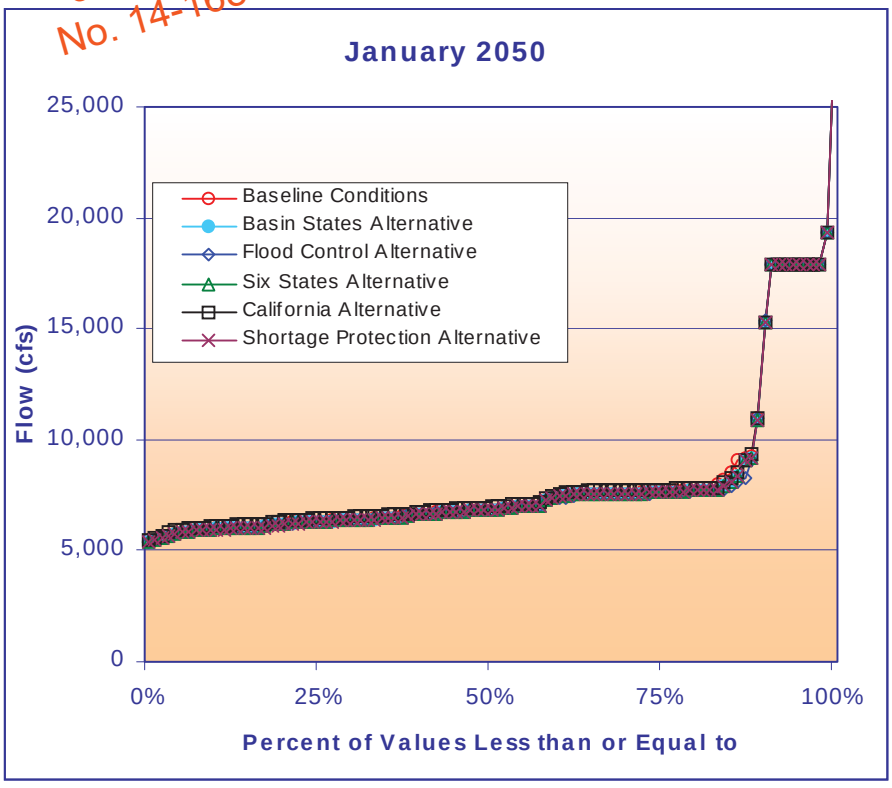
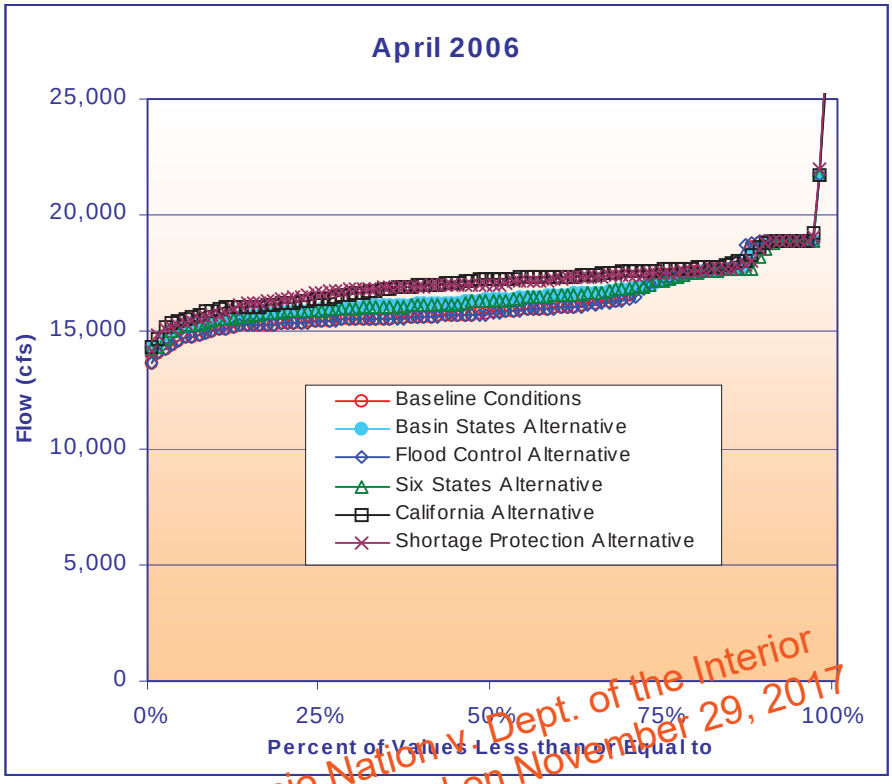


Figure N-2a
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



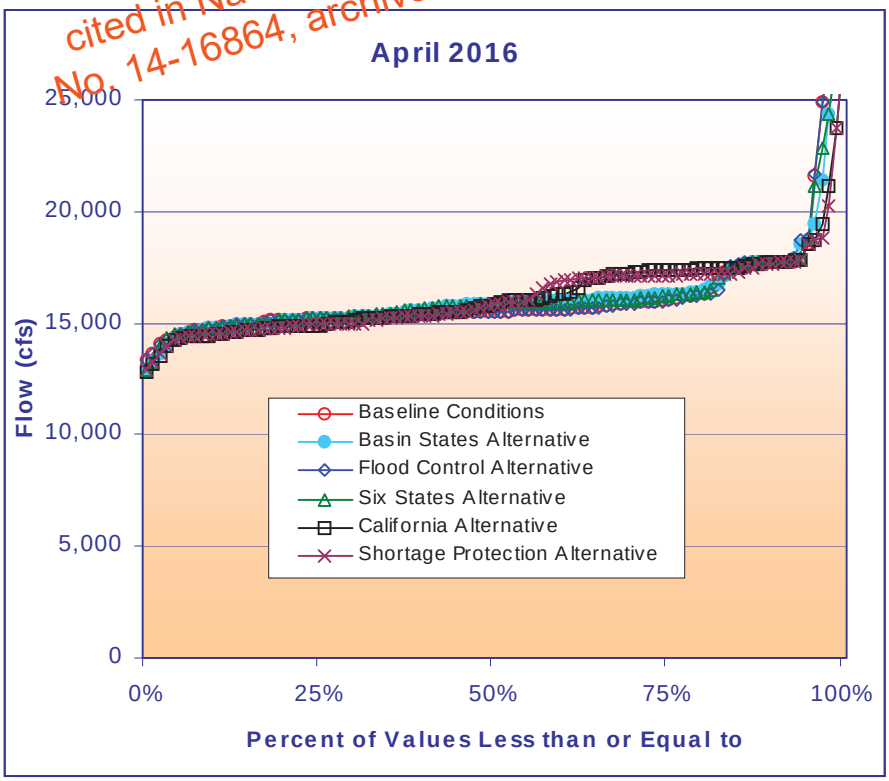
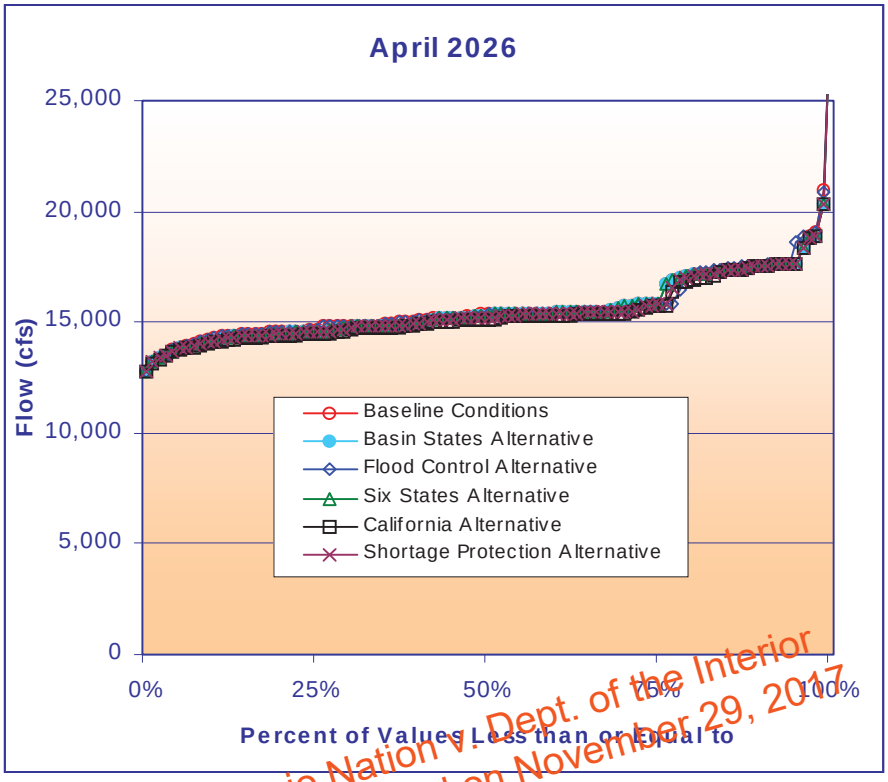


Figure N-2b
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



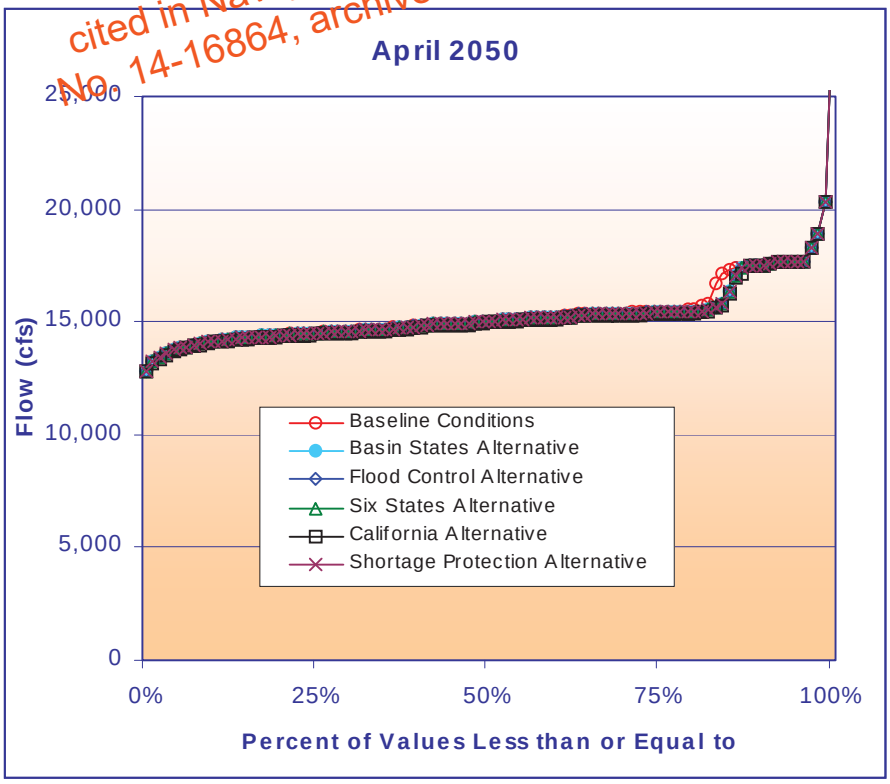
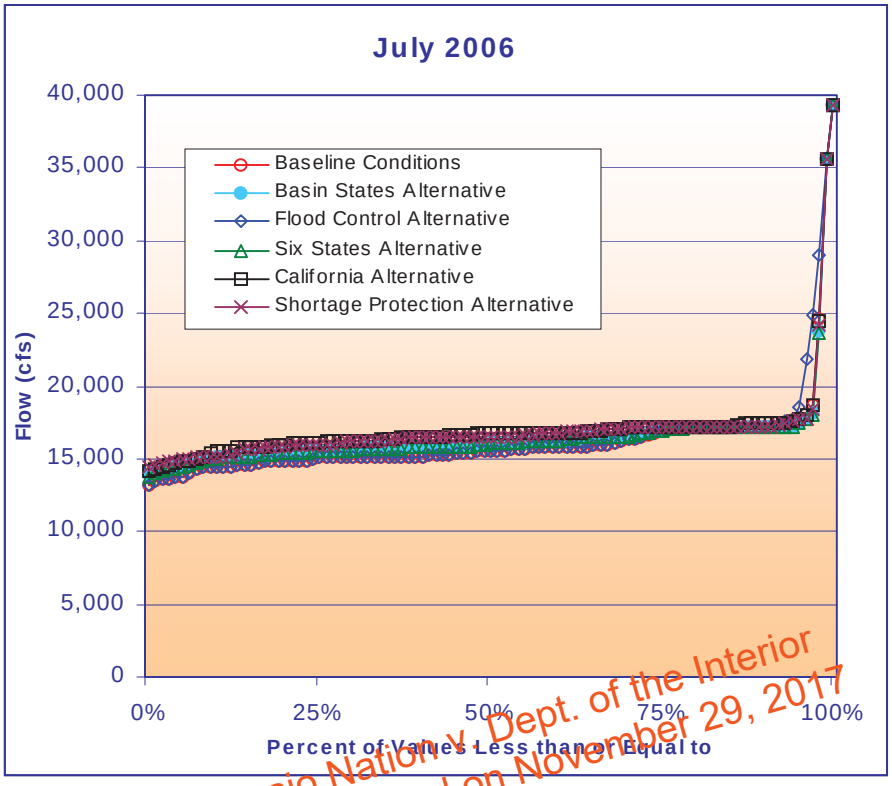


Figure N-3a
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for Modeled Years 2006 and 2016



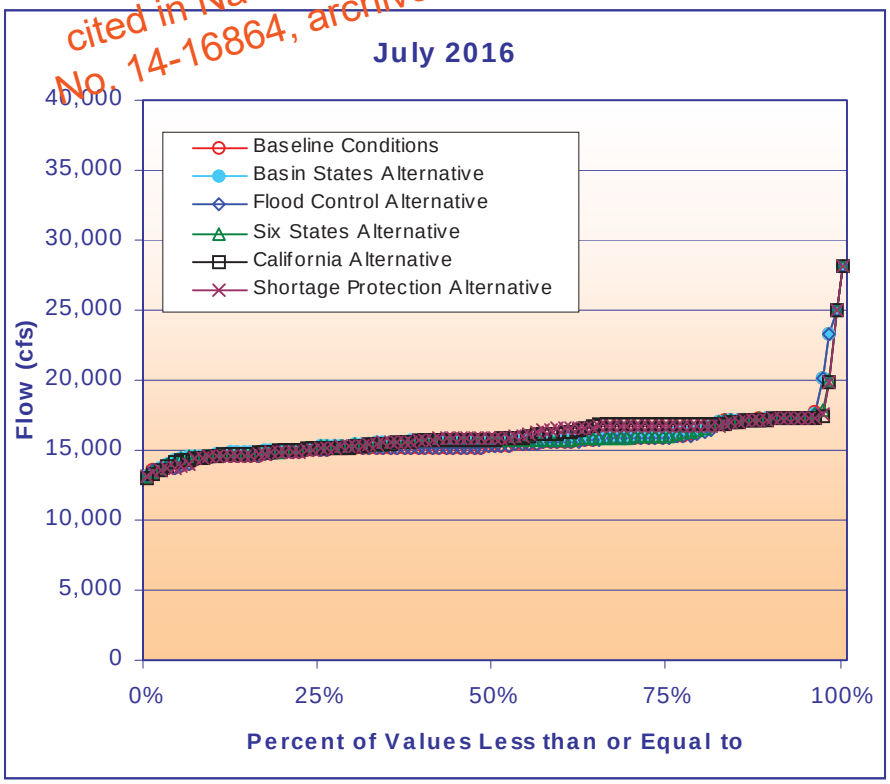
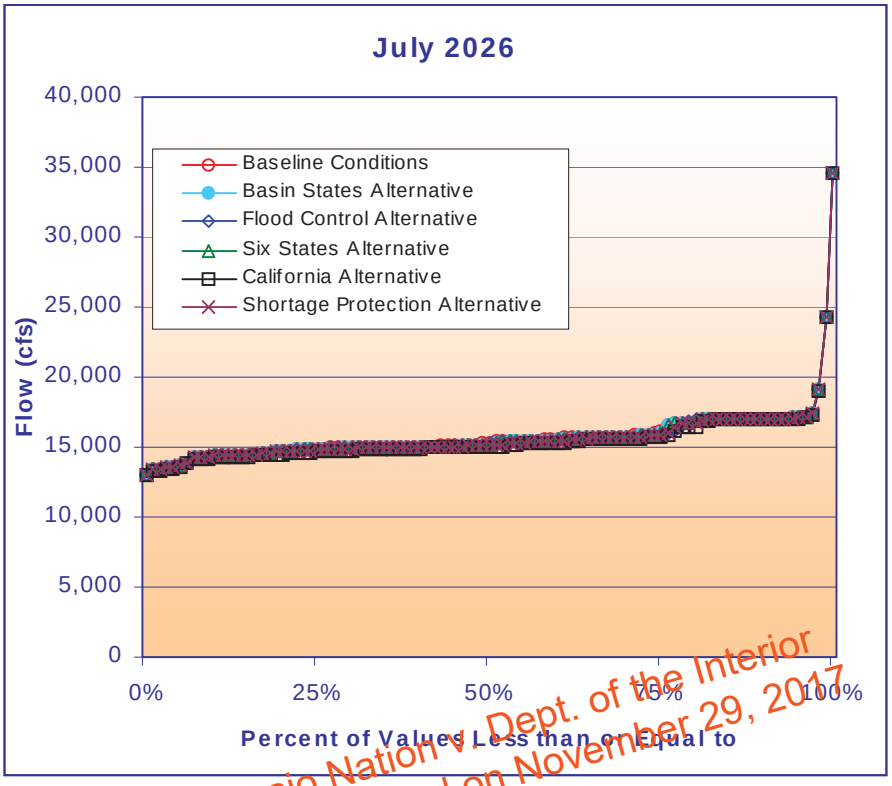


Figure N-3b
Colorado River Seasonal Flows Downstream of Havasu NWR
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



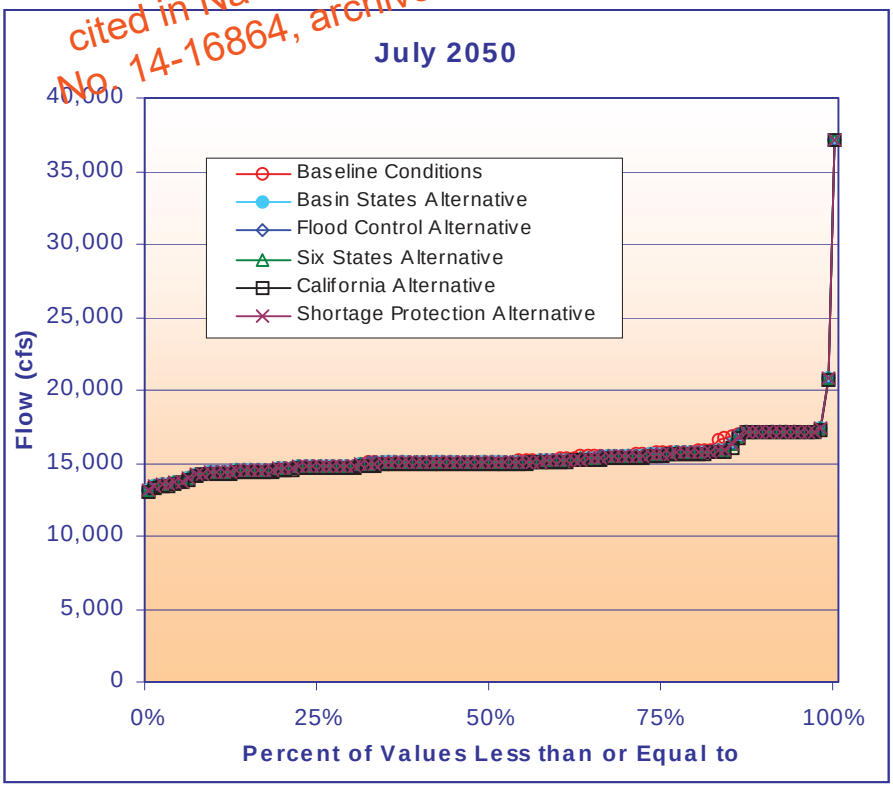
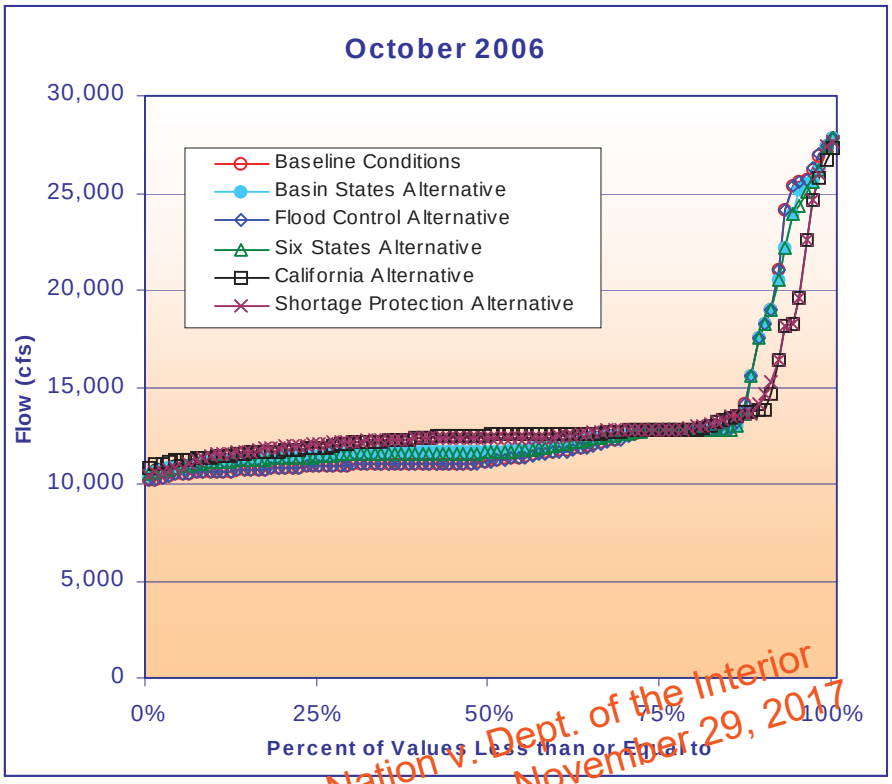


Figure N-4a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



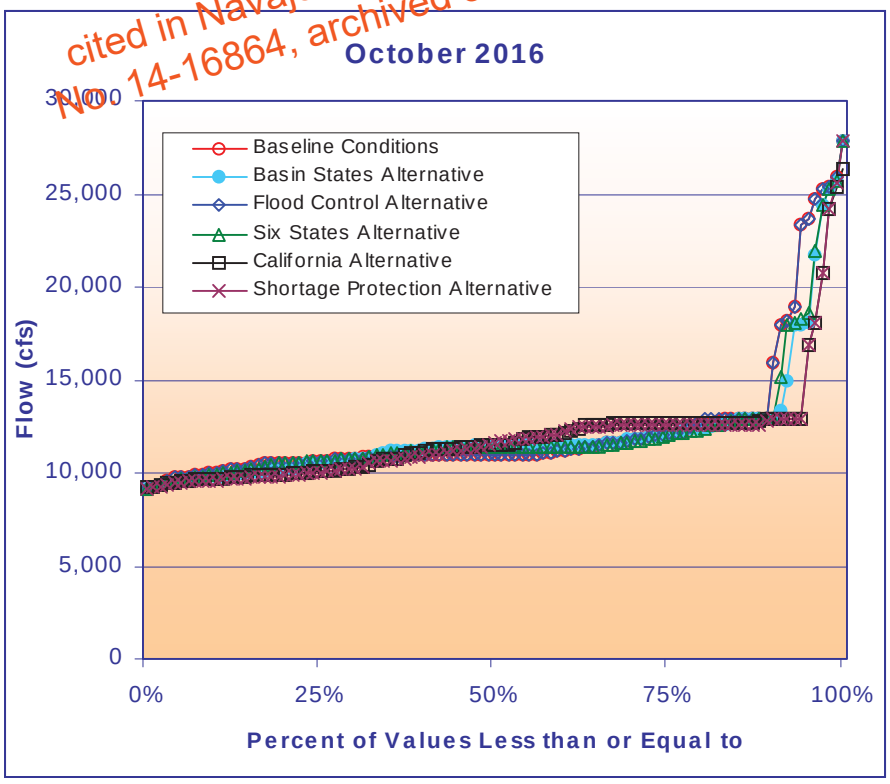
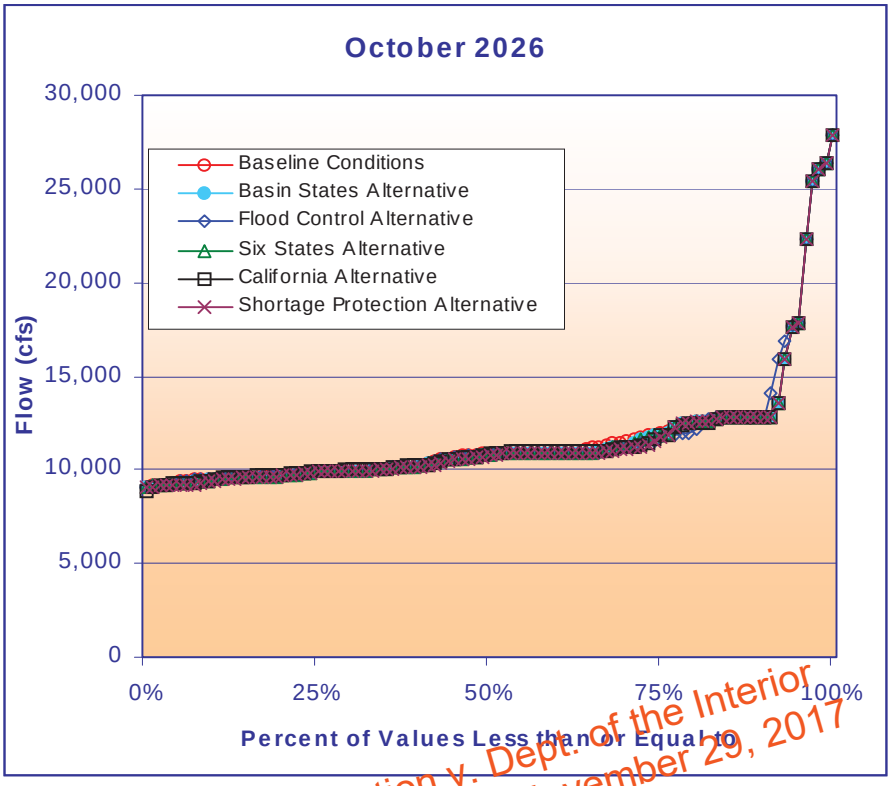


Figure N-4b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



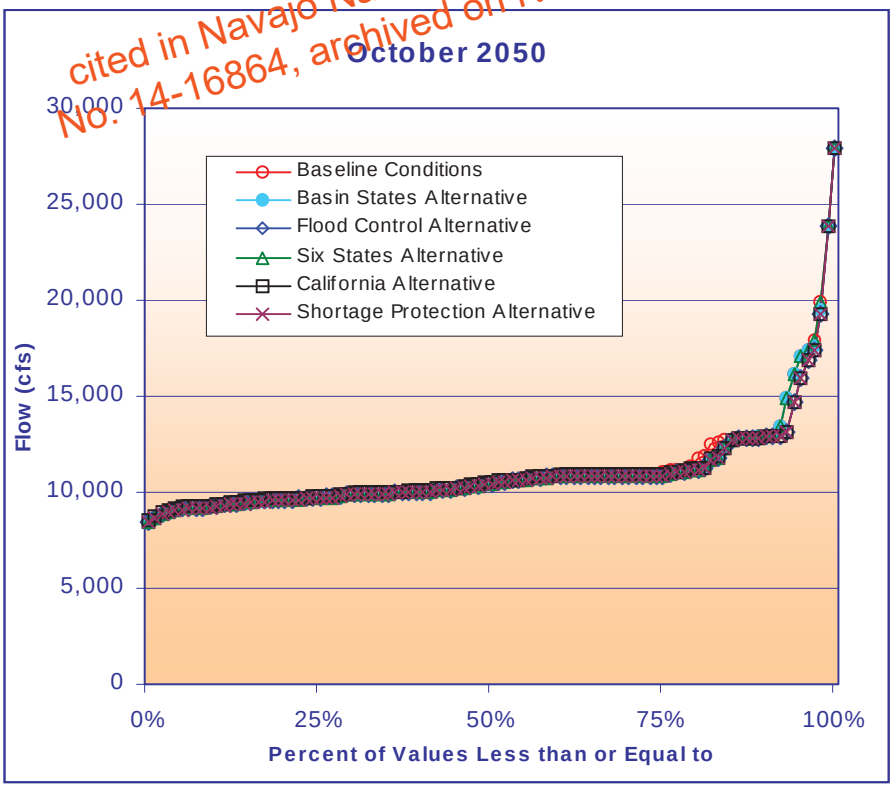
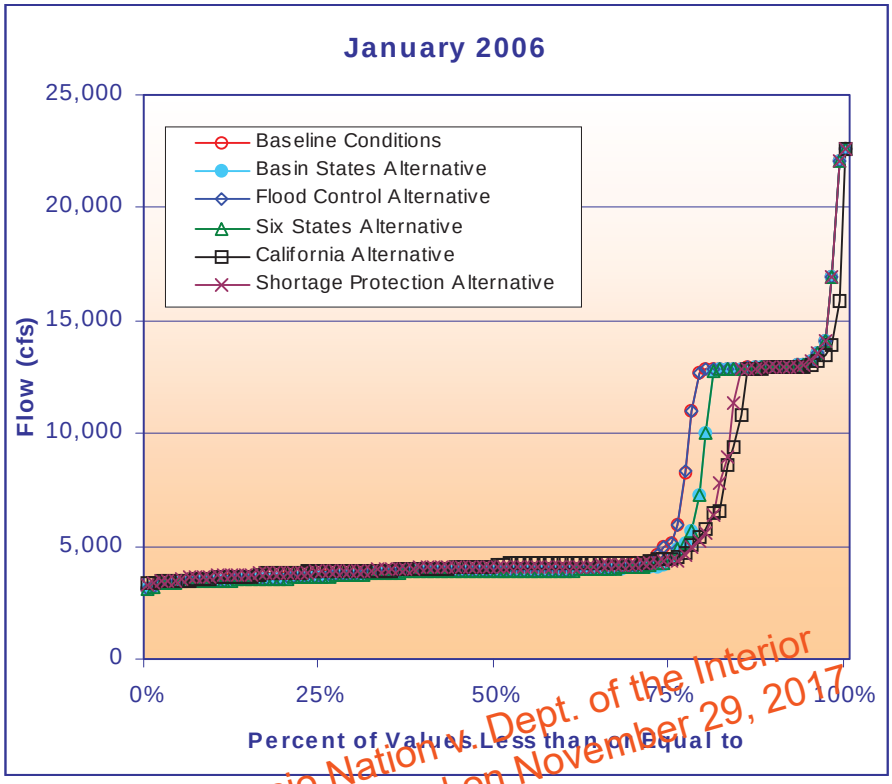


Figure N-5a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



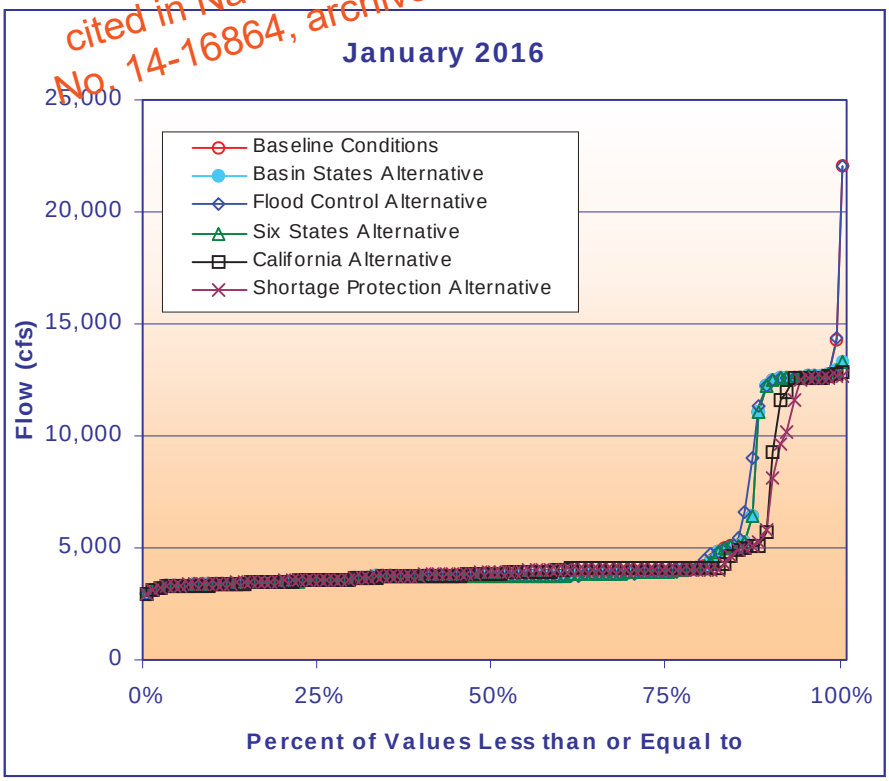
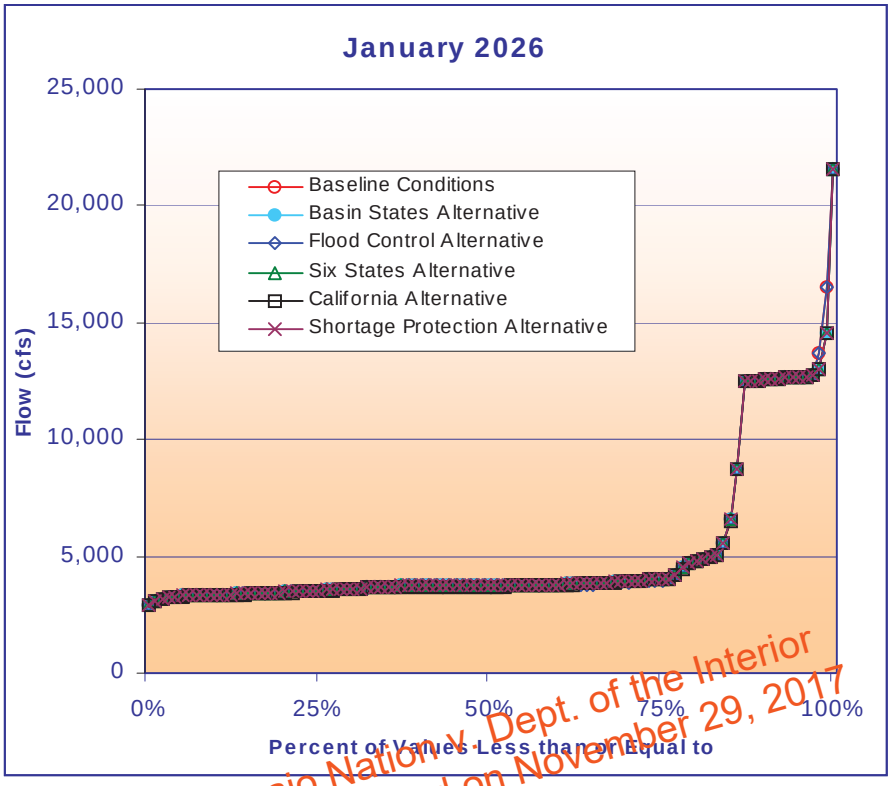


Figure N-5b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



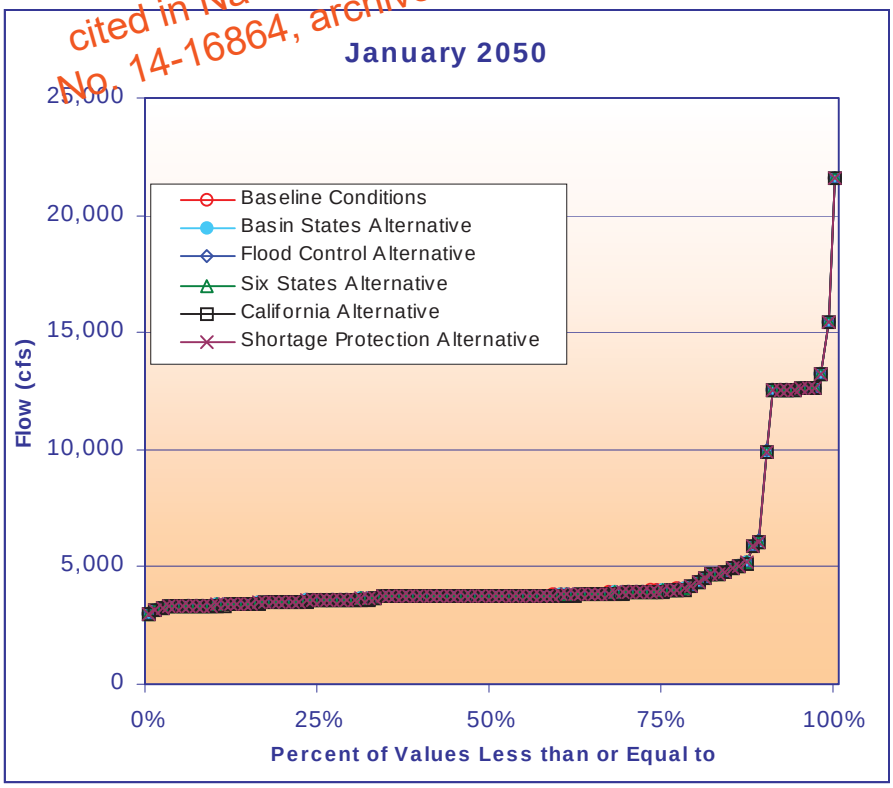
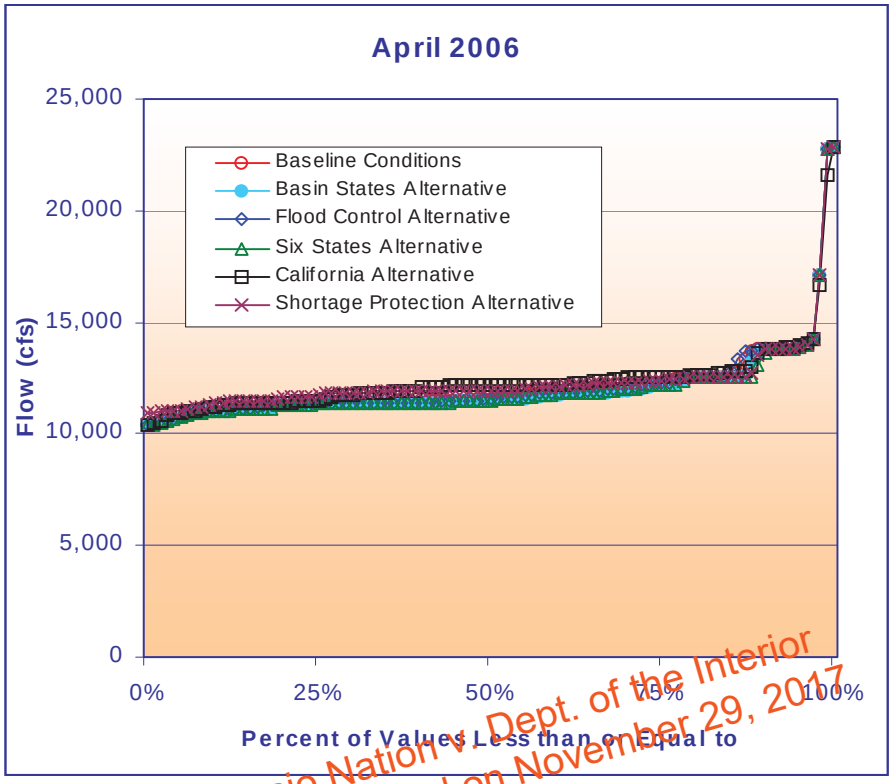


Figure N-6a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



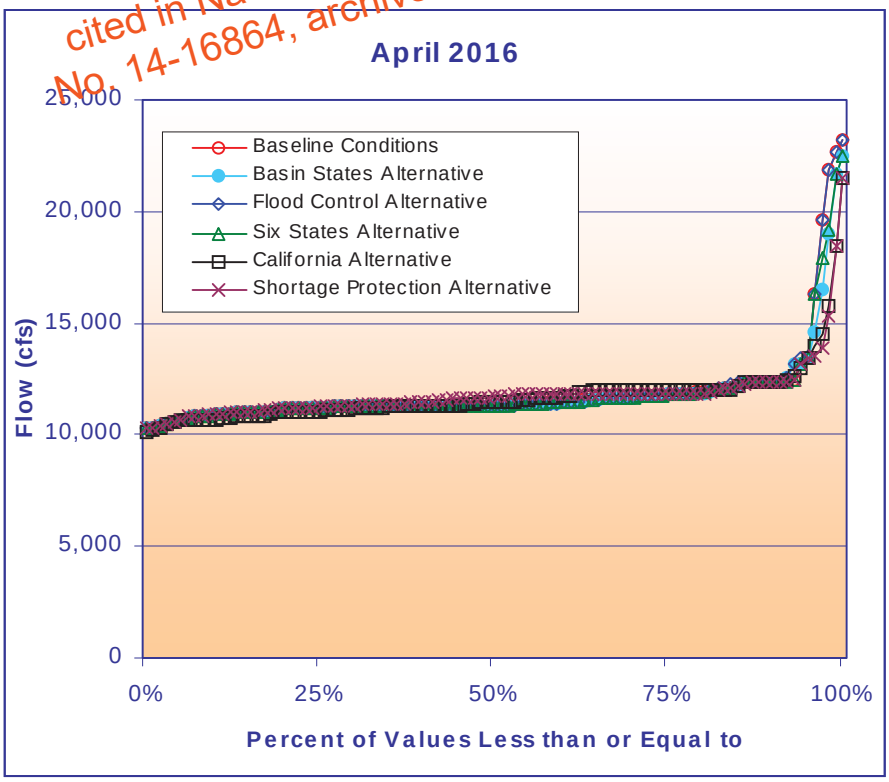
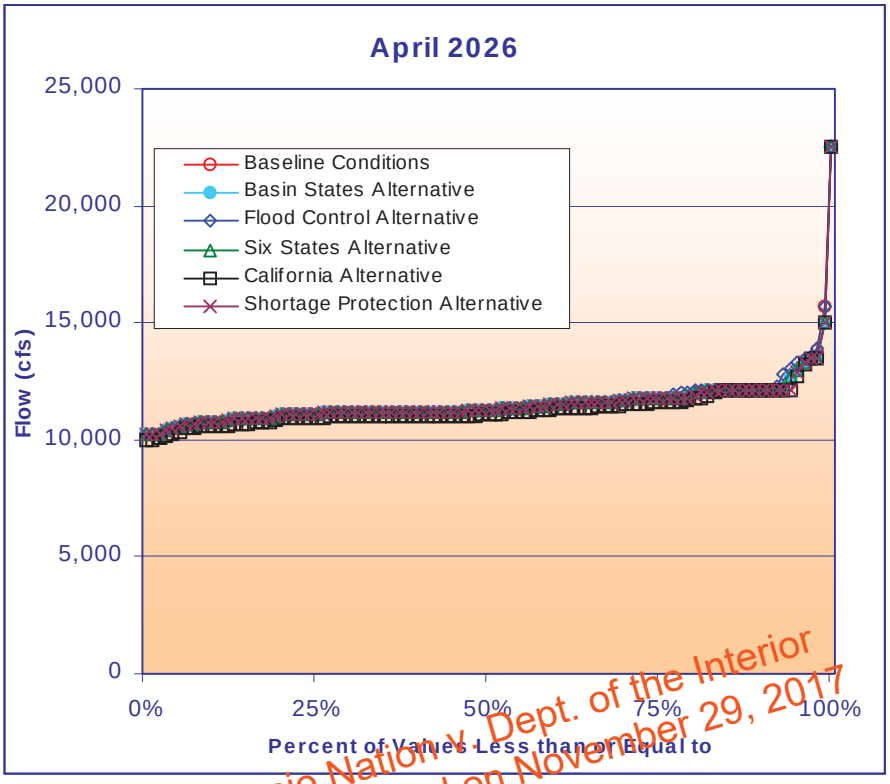


Figure N-6b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



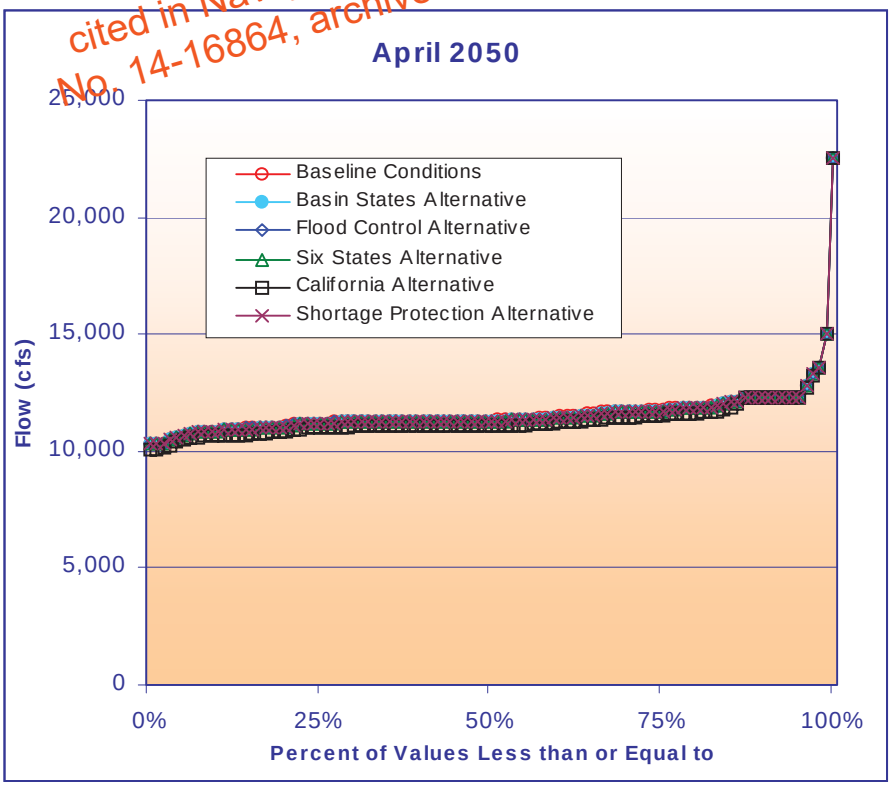
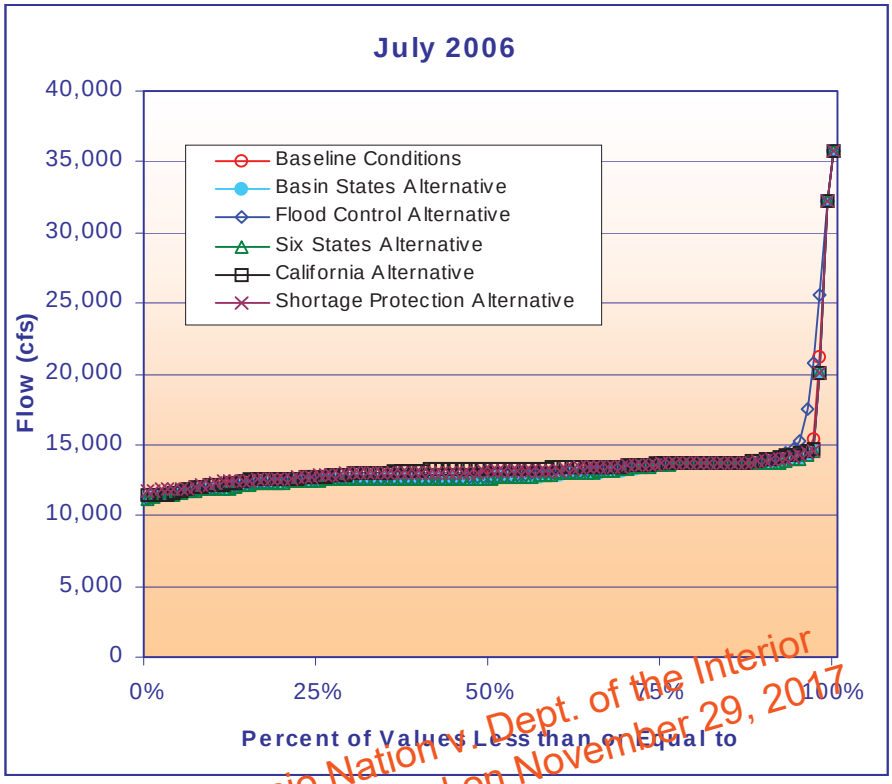


Figure N-7a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



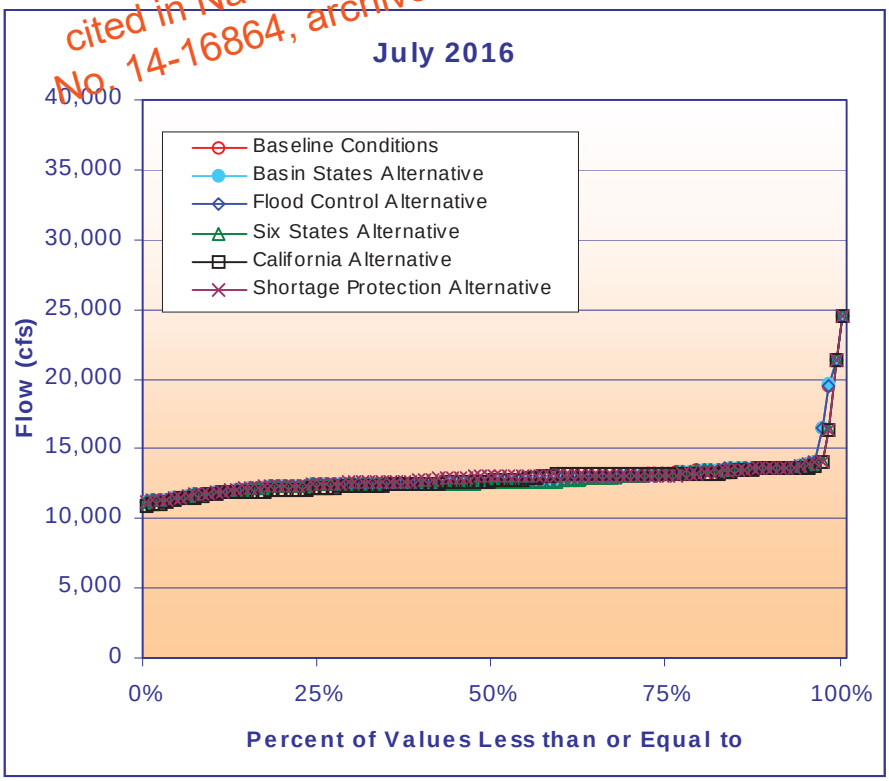
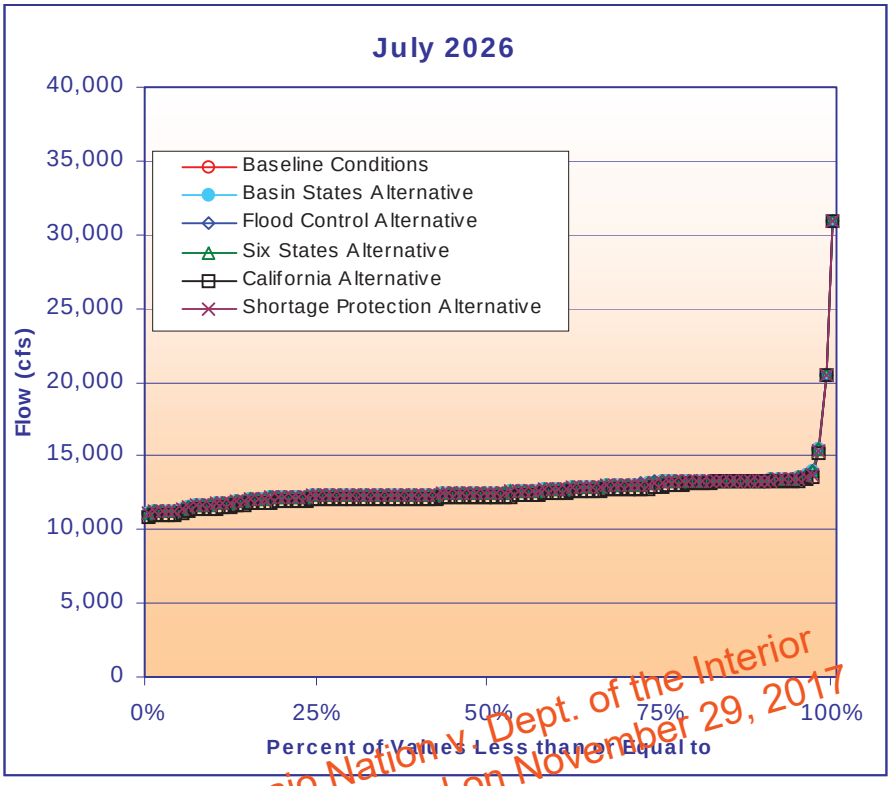


Figure N-7b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



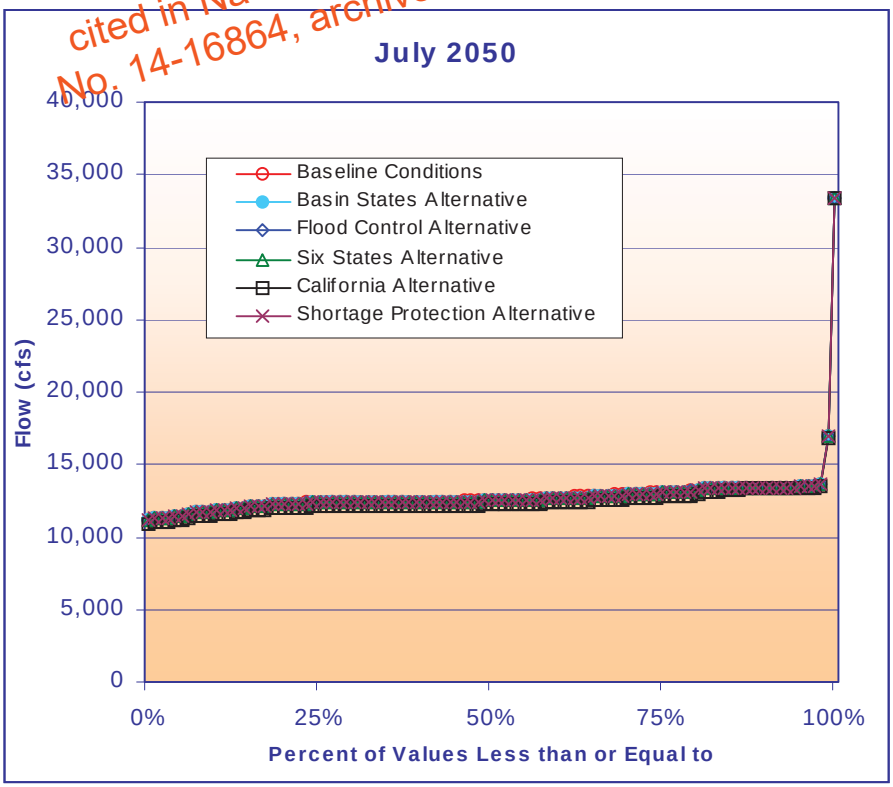
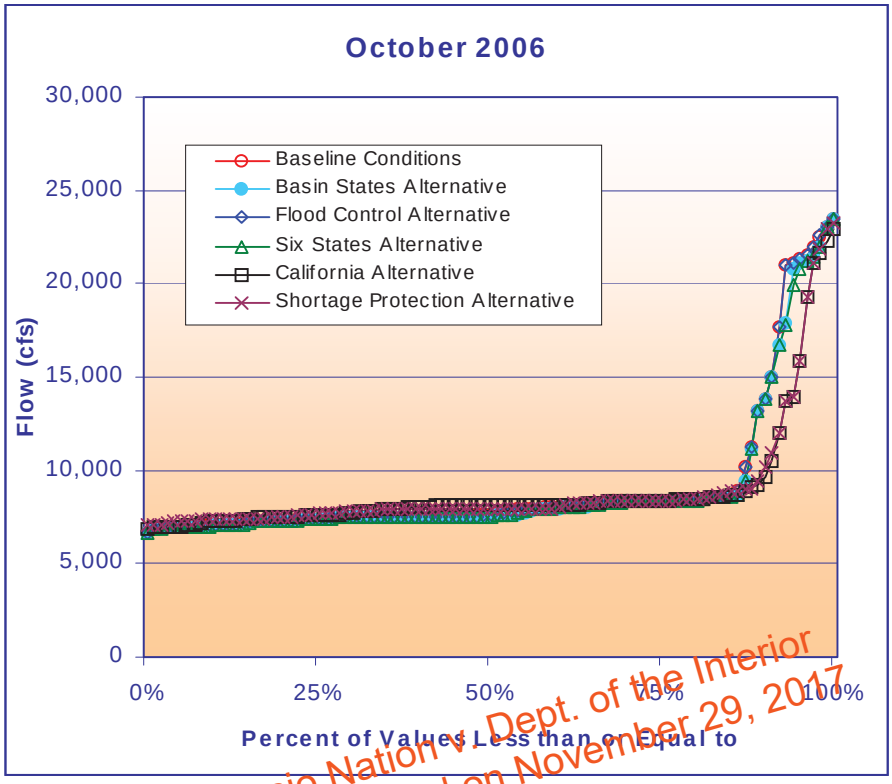


Figure N-8a
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



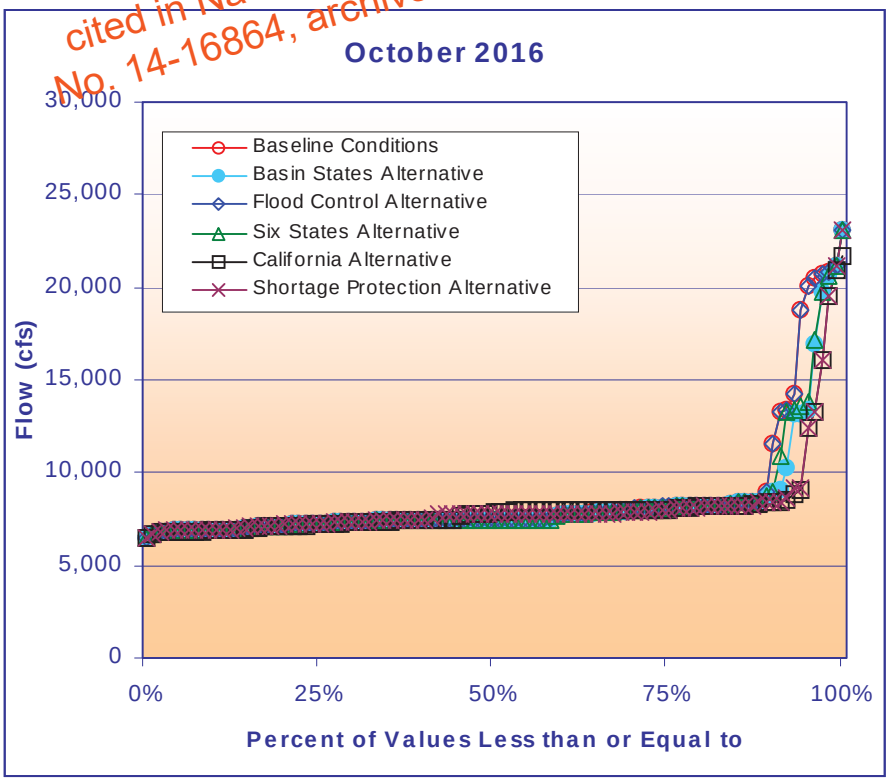
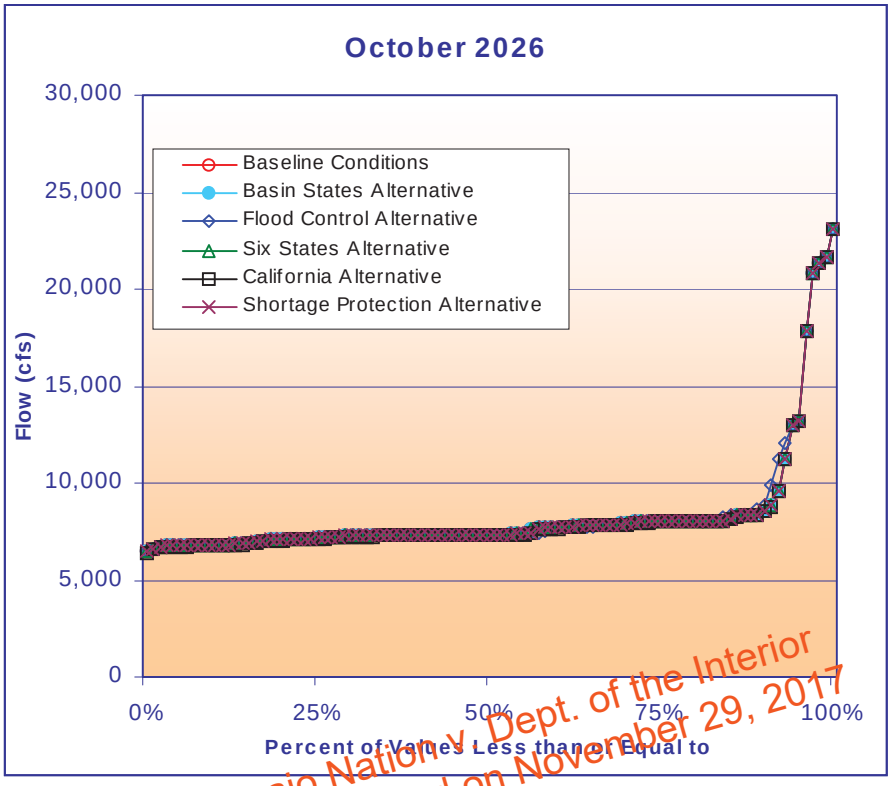


Figure N-8b
Colorado River Seasonal Flows Upstream of Colorado River Indian Reservation
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



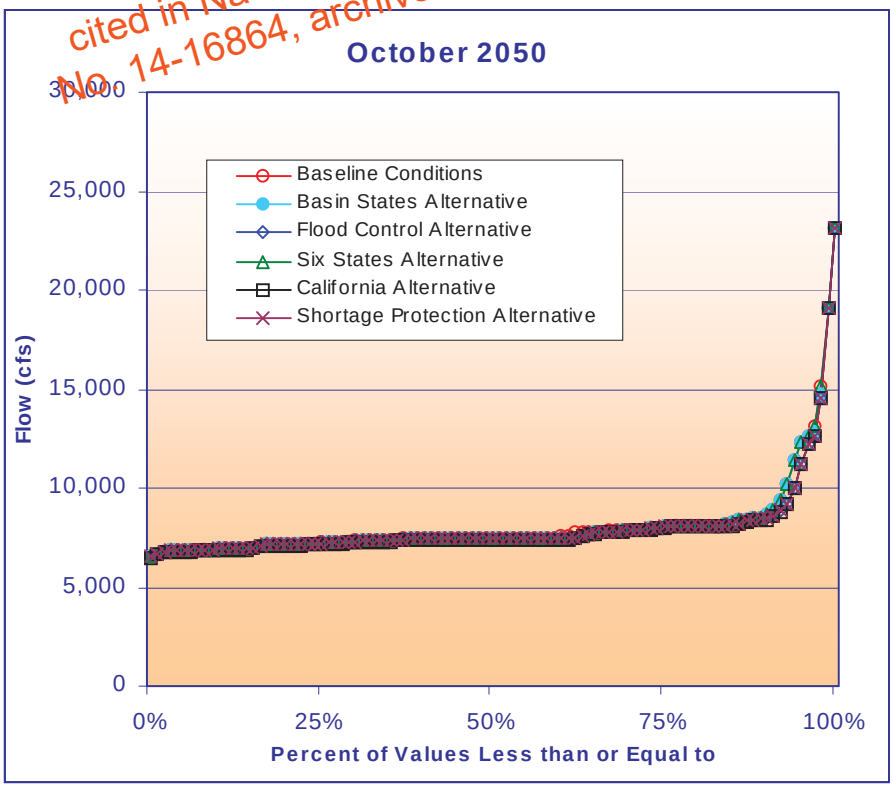
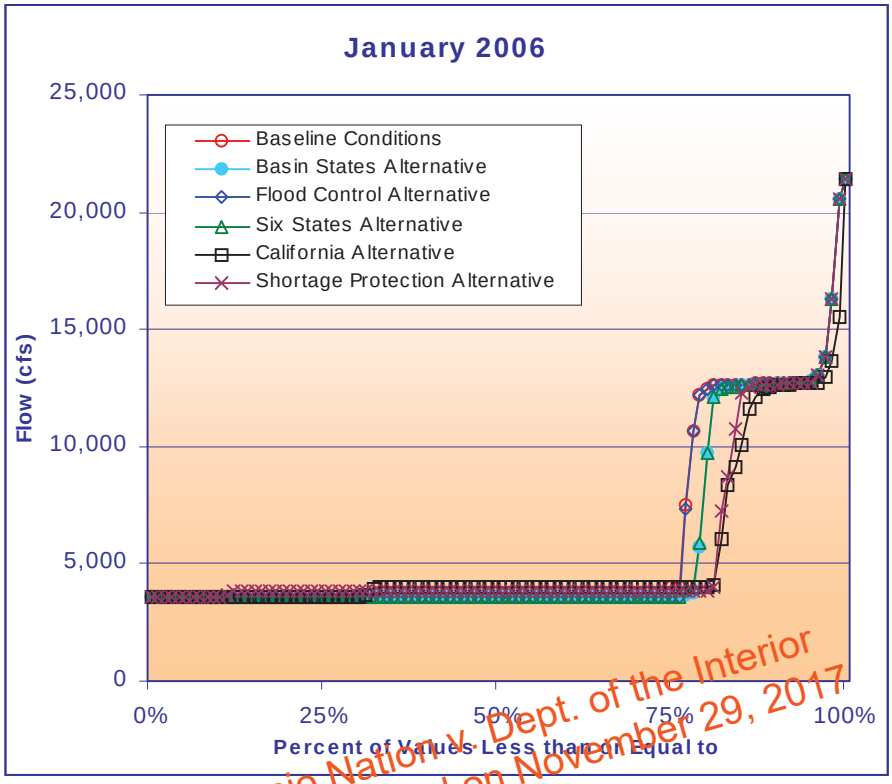


Figure N-9a
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



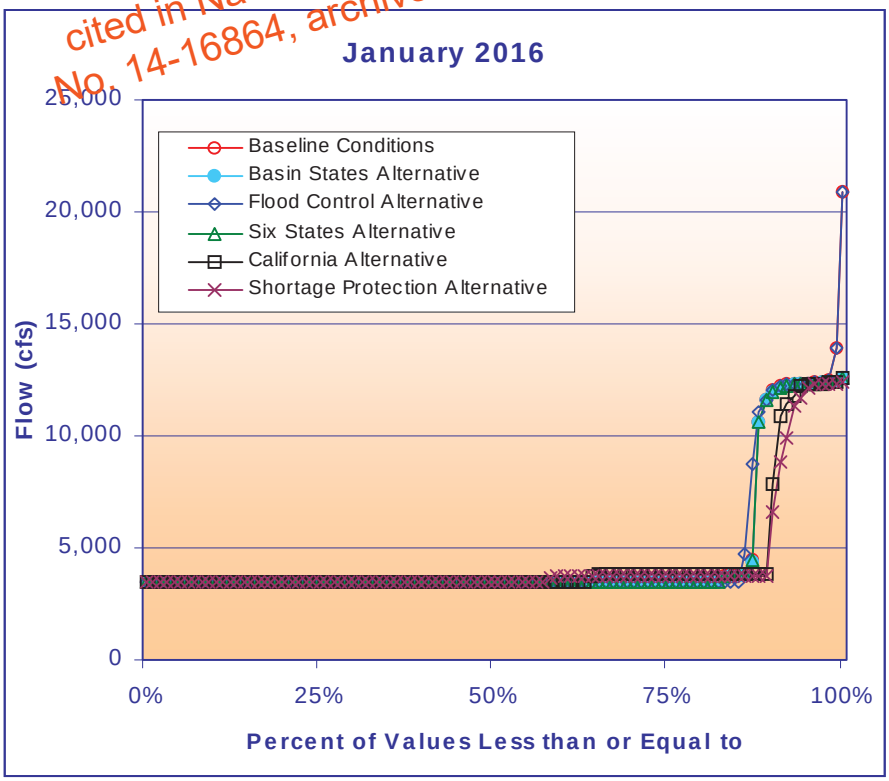
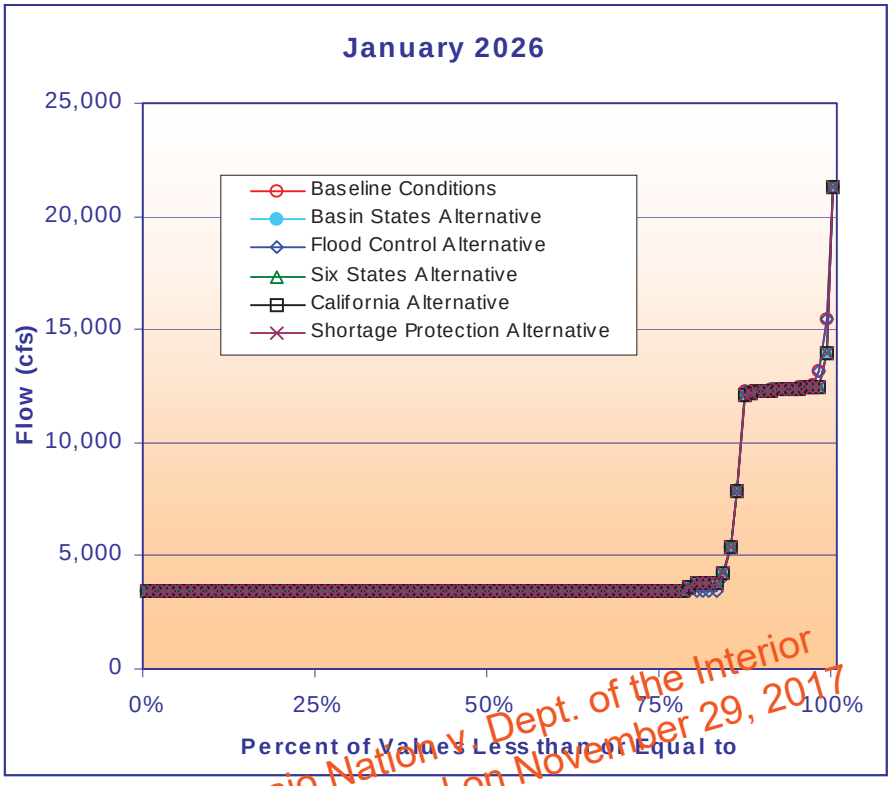


Figure N-9b
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



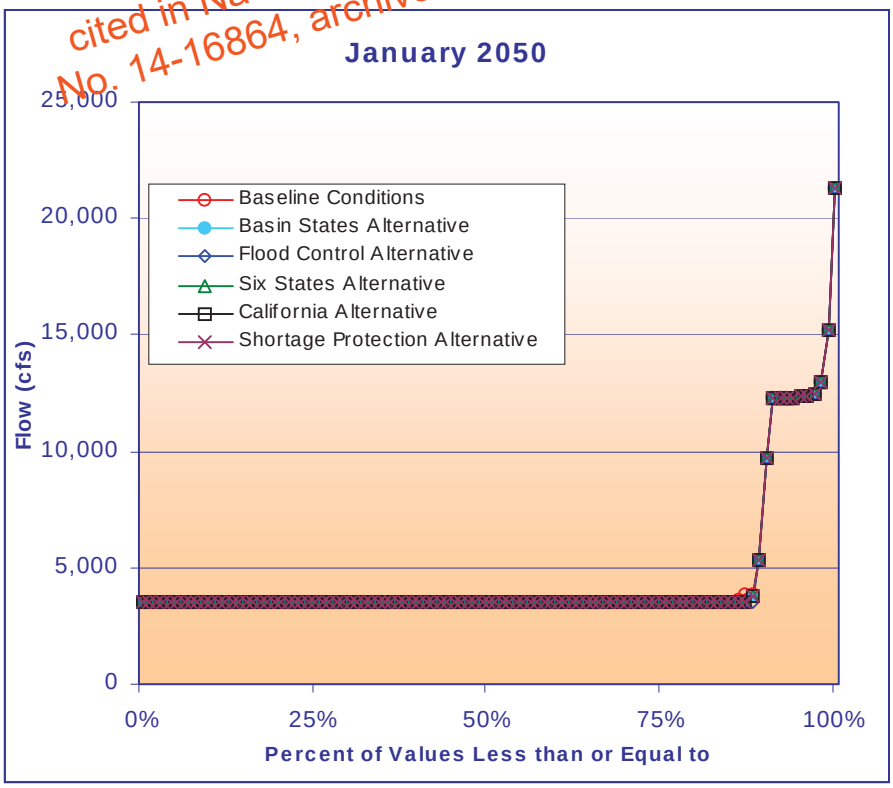
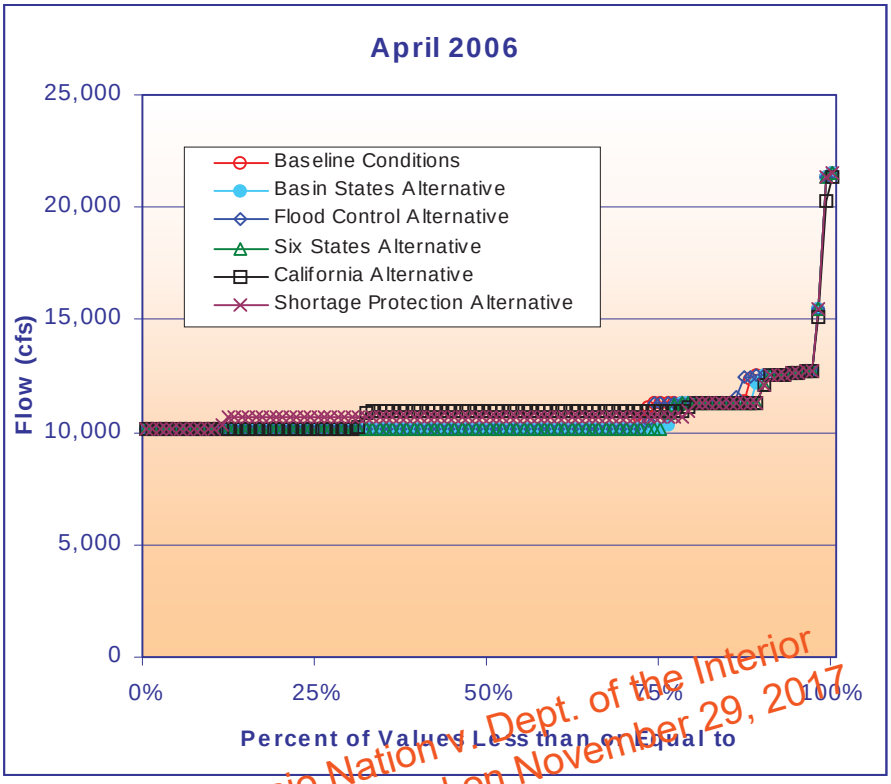


Figure N-10a
Colorado River Seasonal Flows Downstream of Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



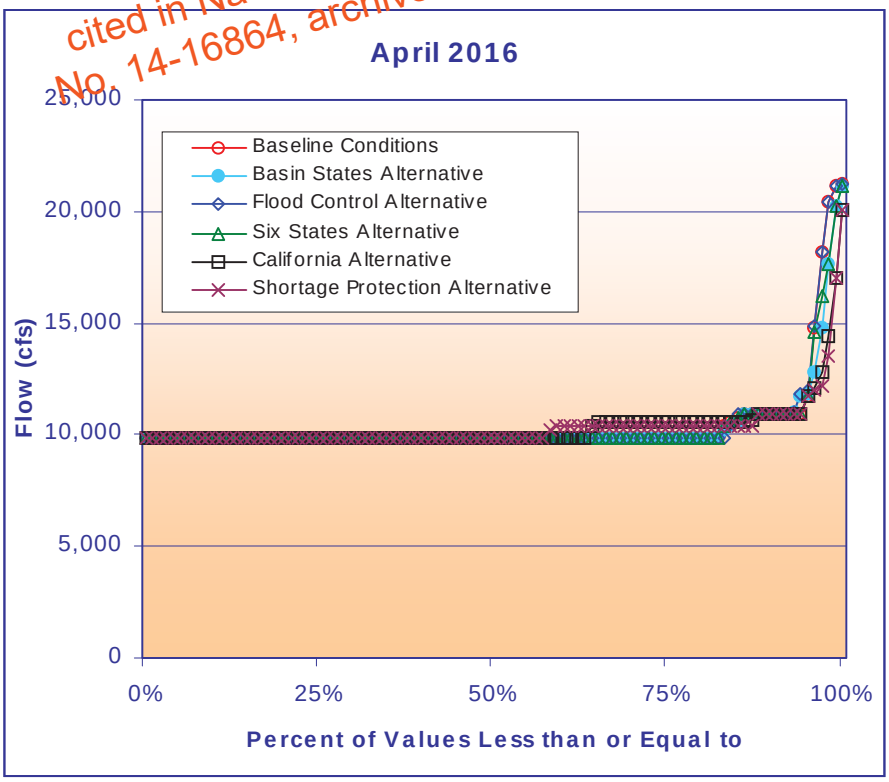
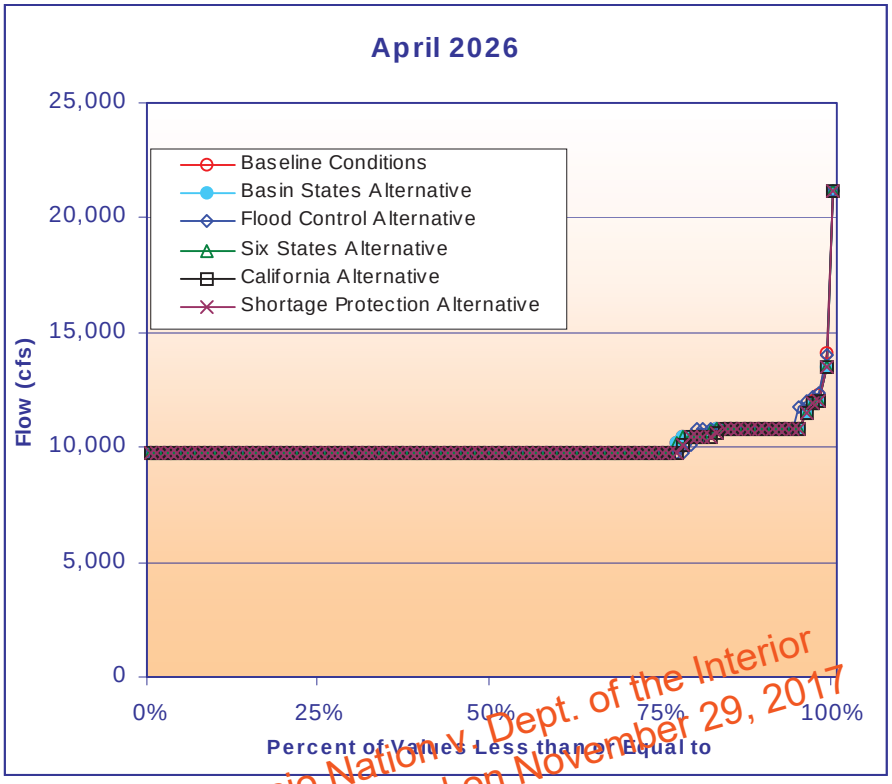


Figure N-10b
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



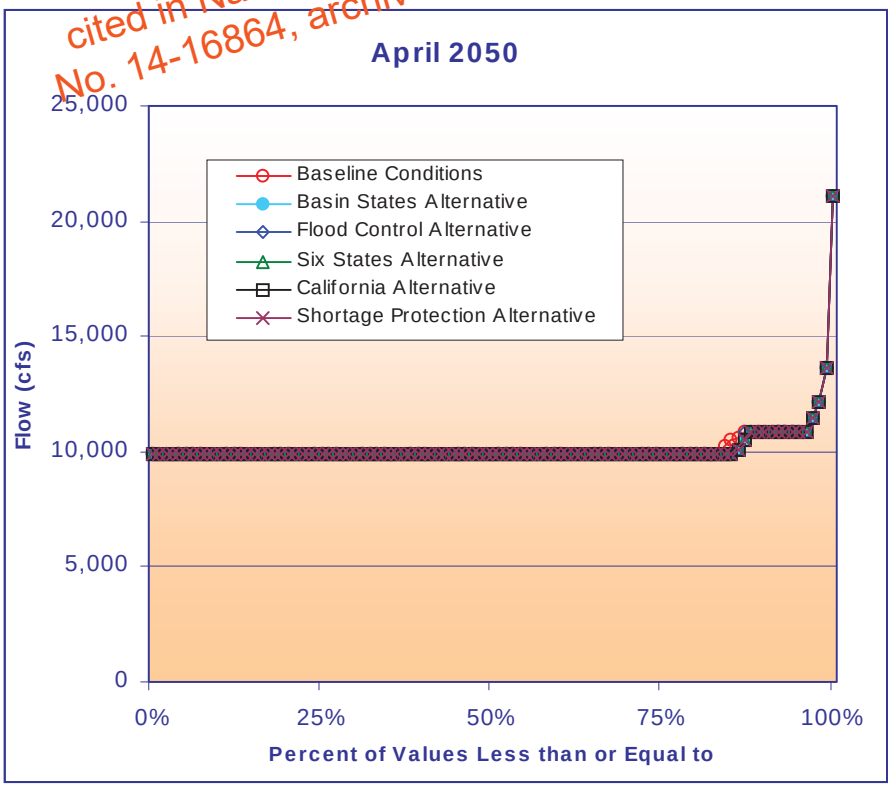
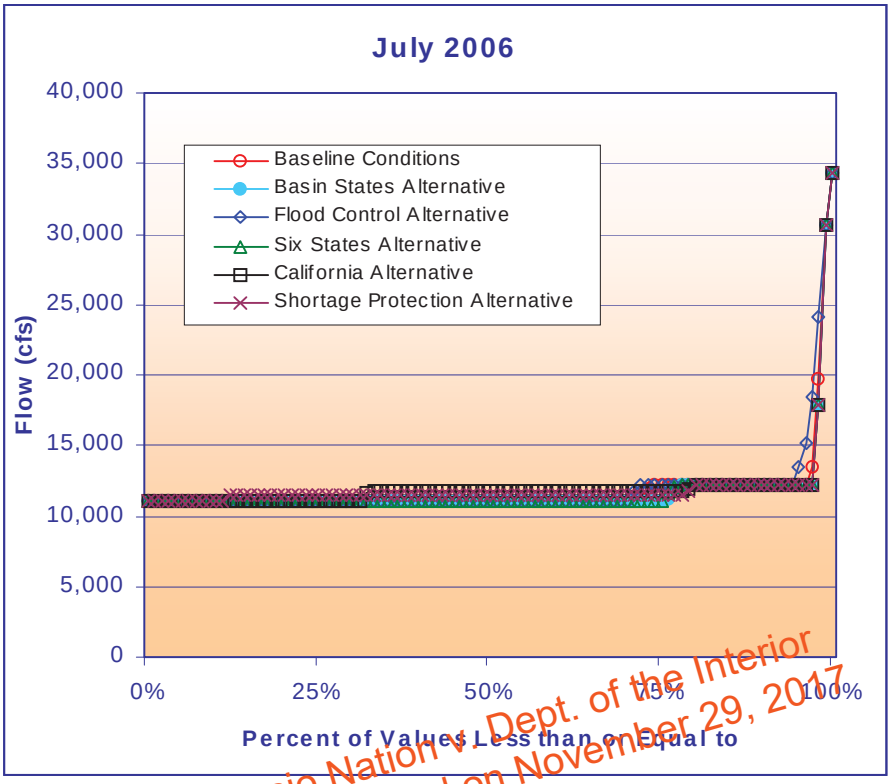


Figure N-11a
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



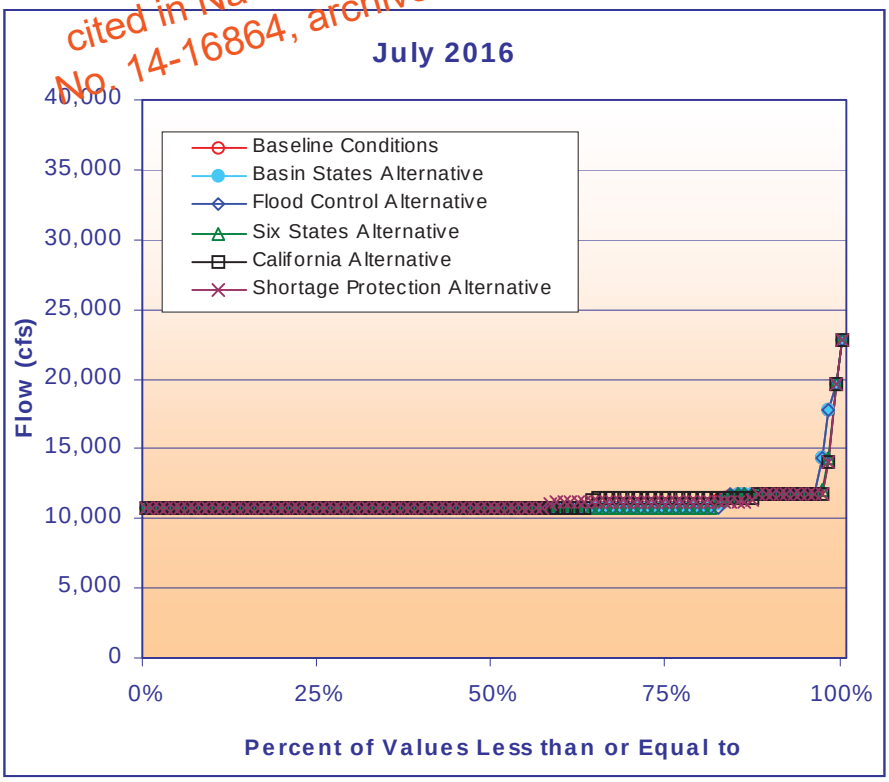
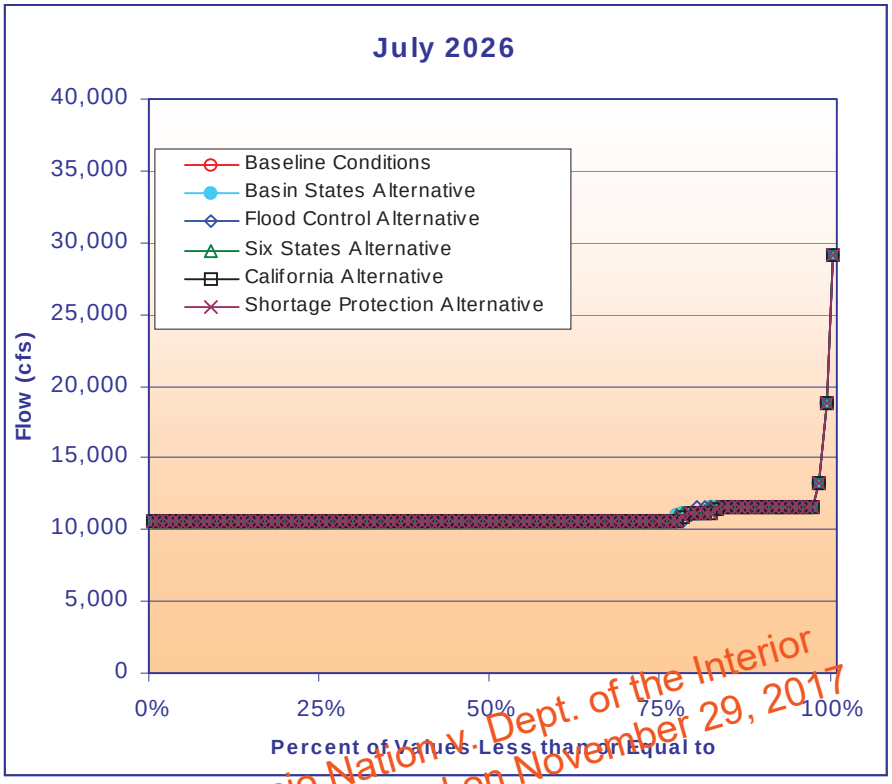


Figure N-11b
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



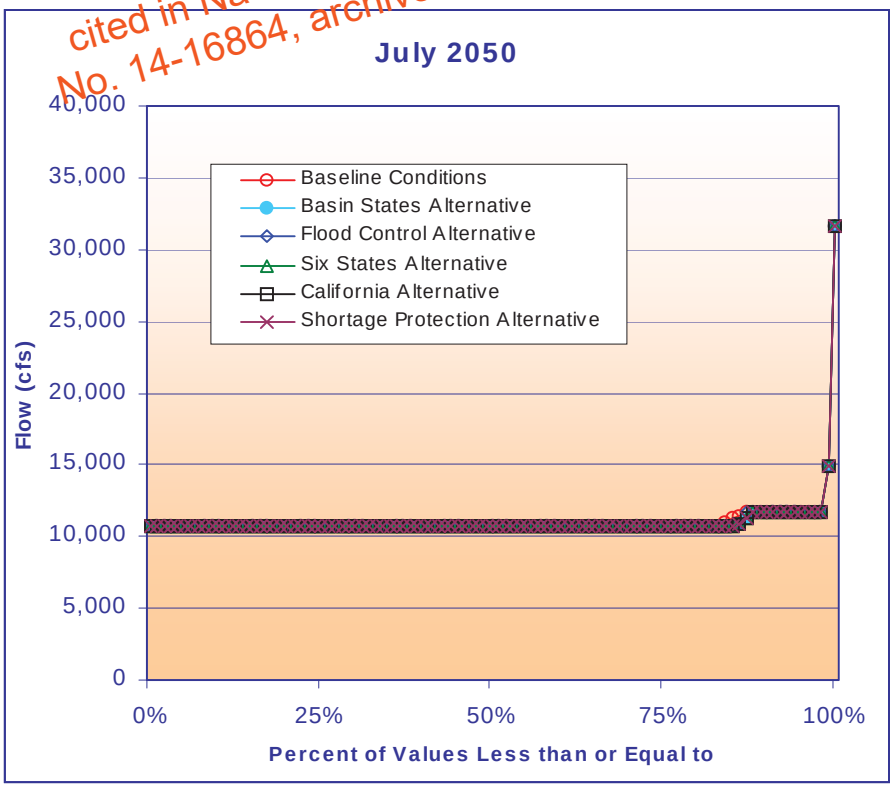
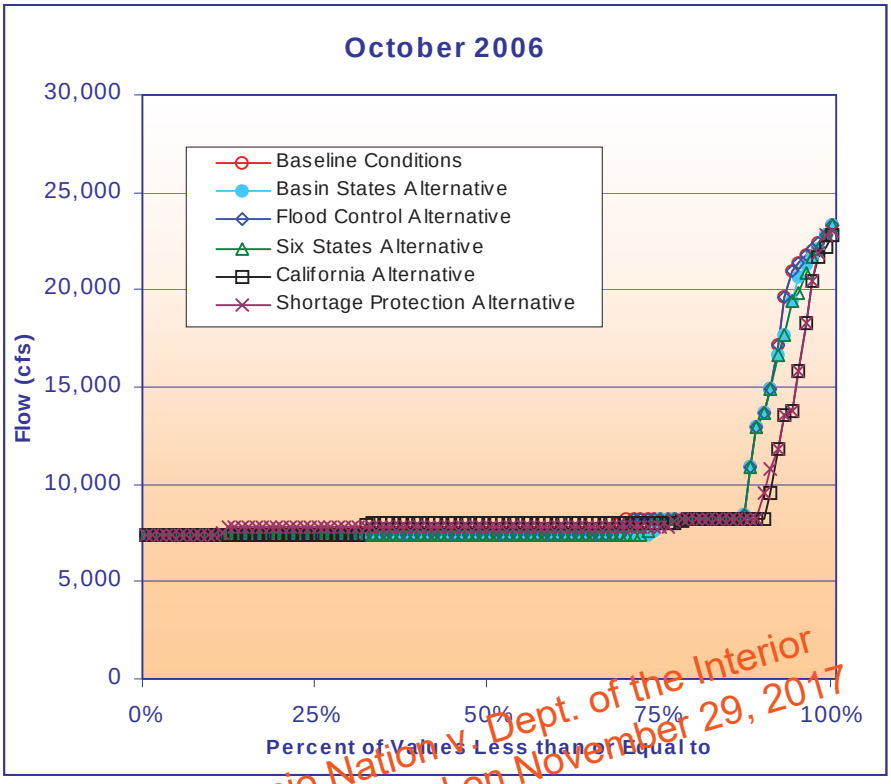


Figure N-12a
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



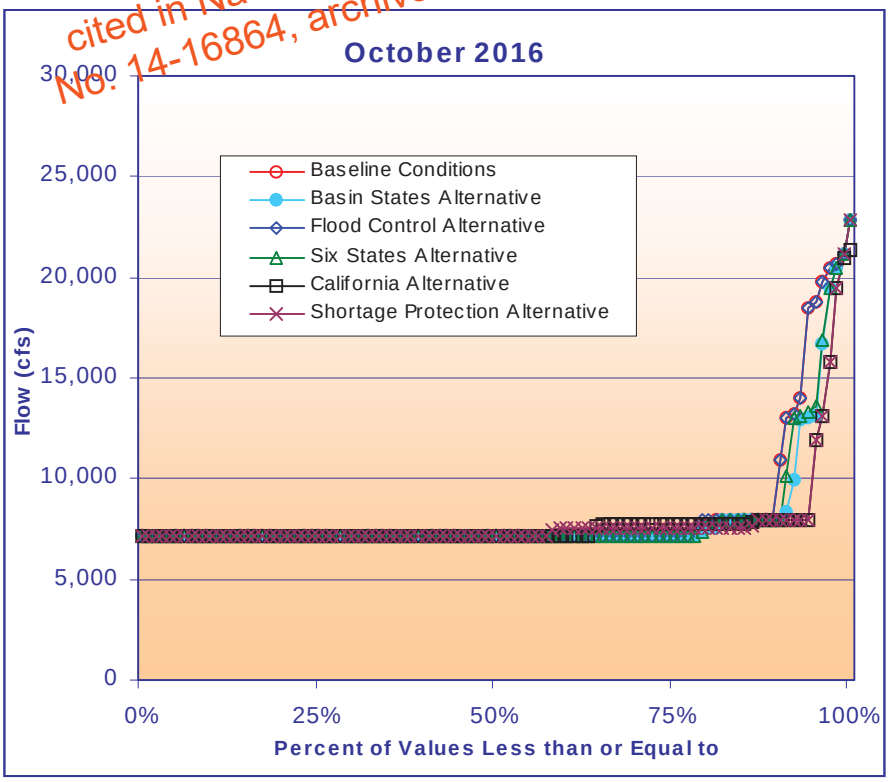
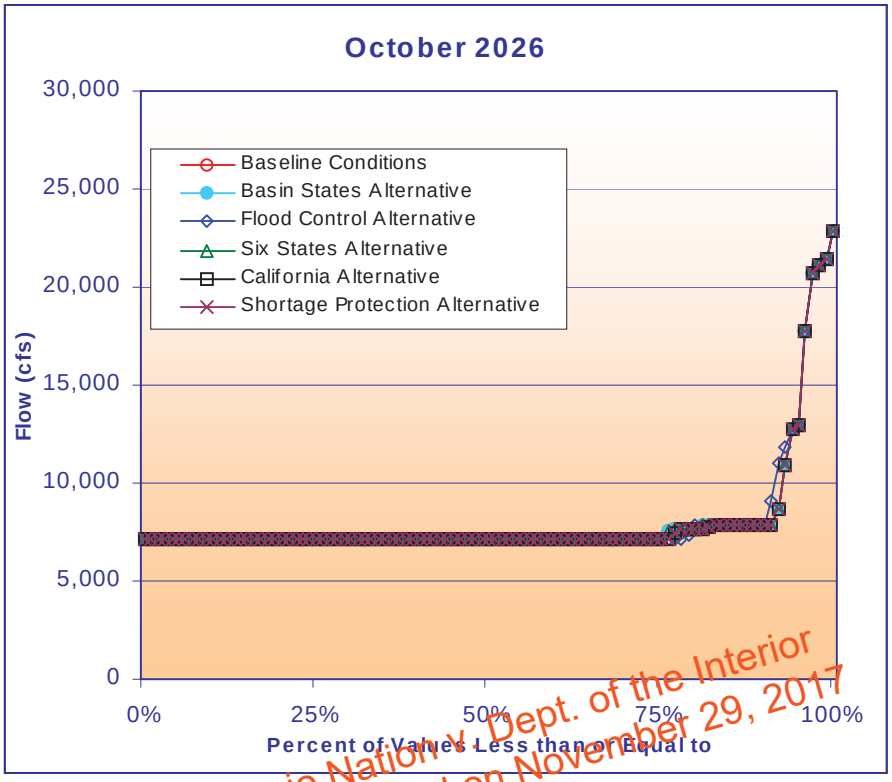


Figure N-12b
Colorado River Seasonal Flows Downstream of Palo Verde Diversion Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



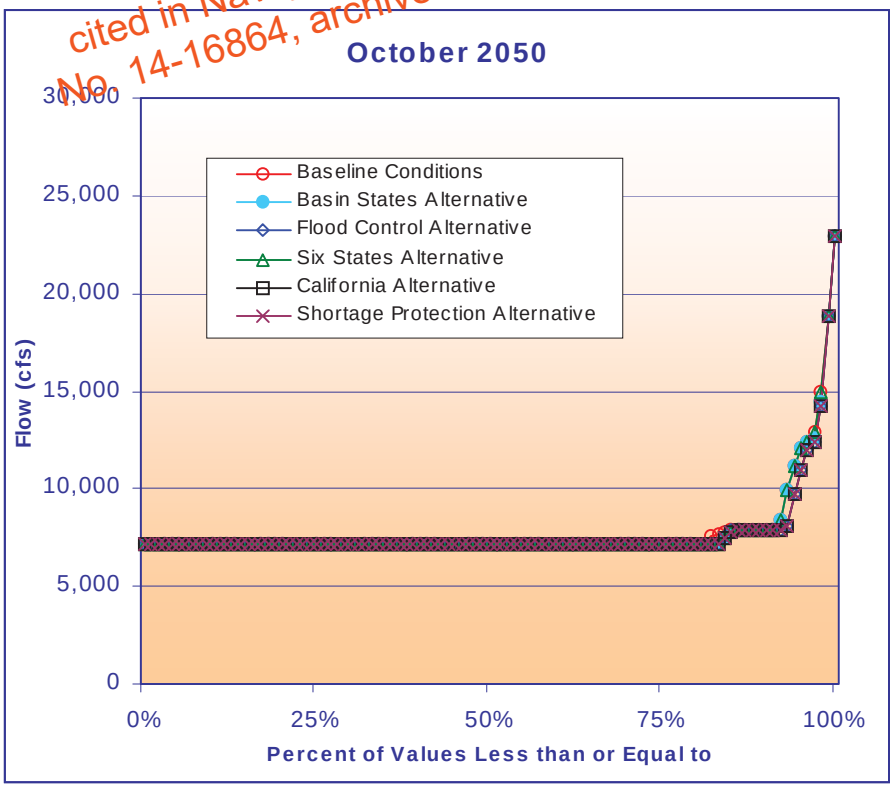
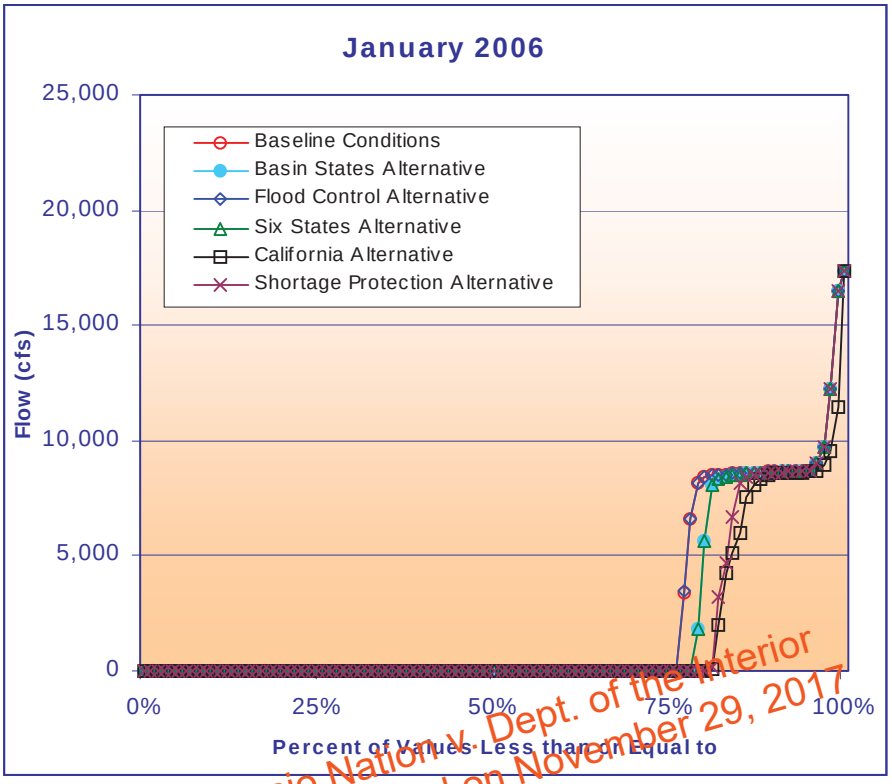


Figure N-13a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



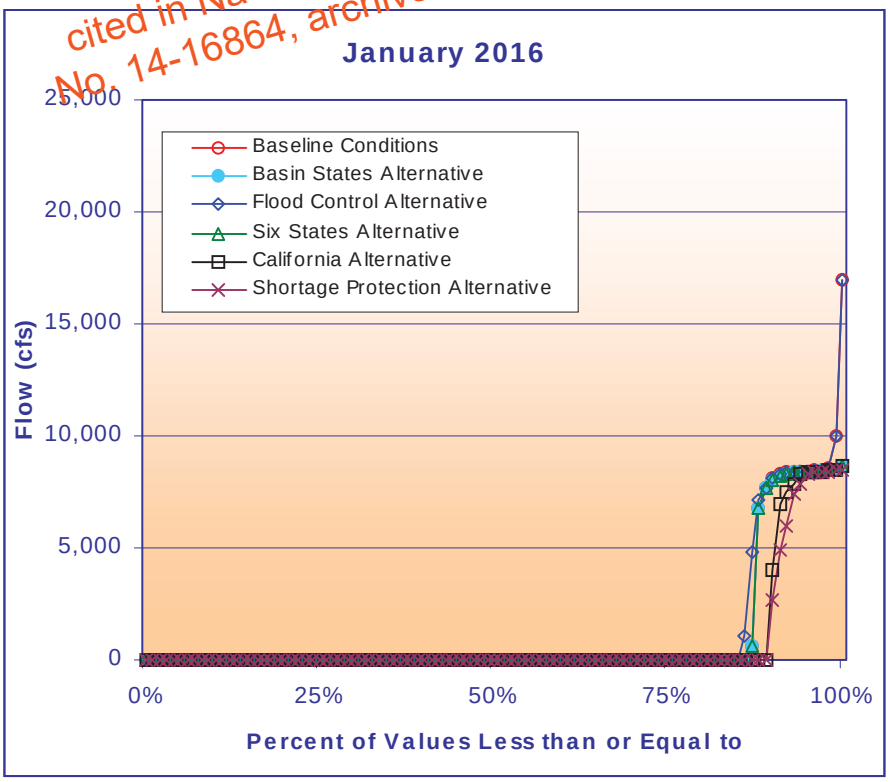
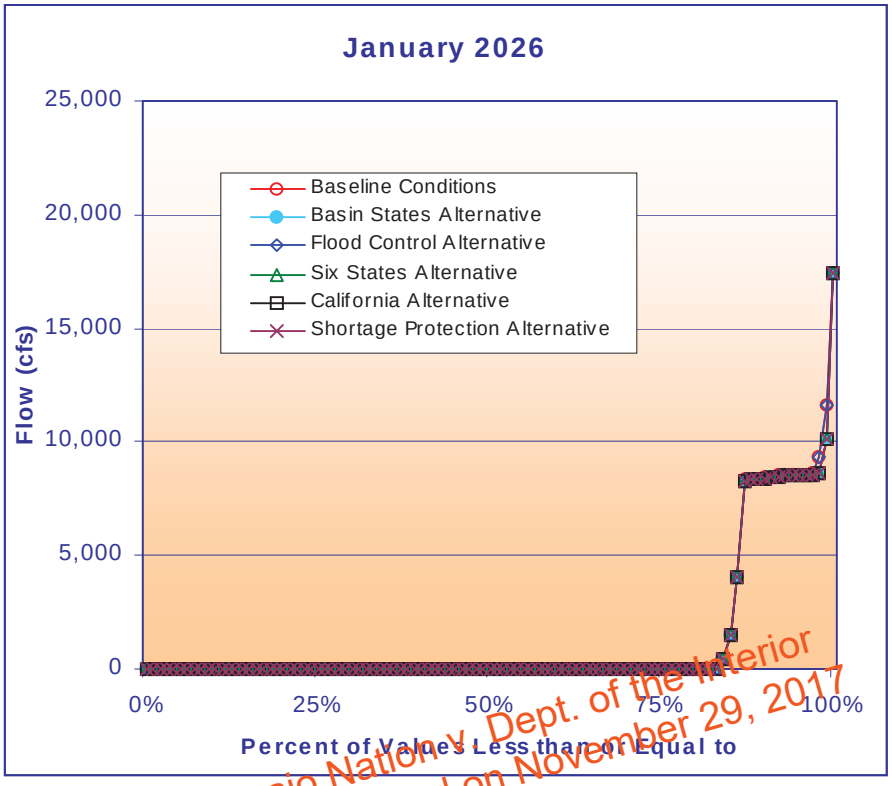


Figure N-13b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



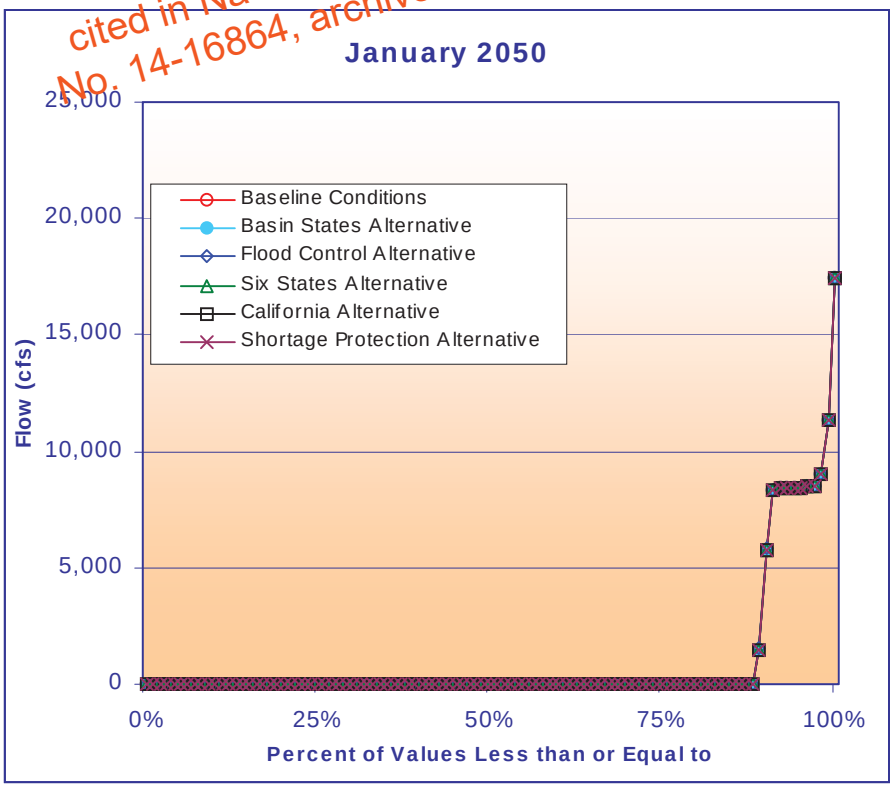
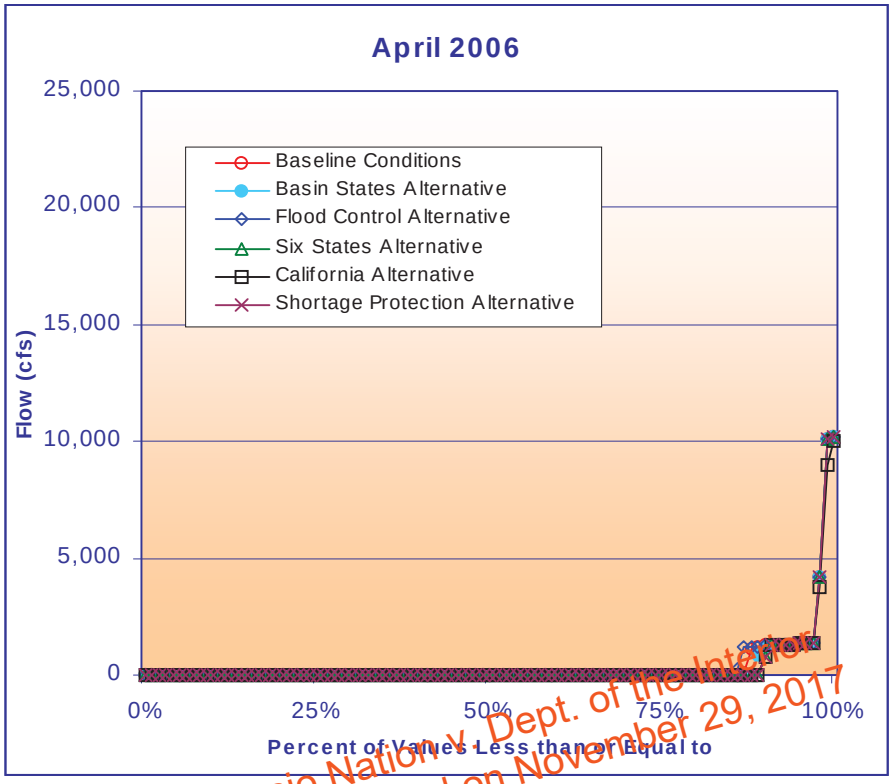


Figure N-14a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



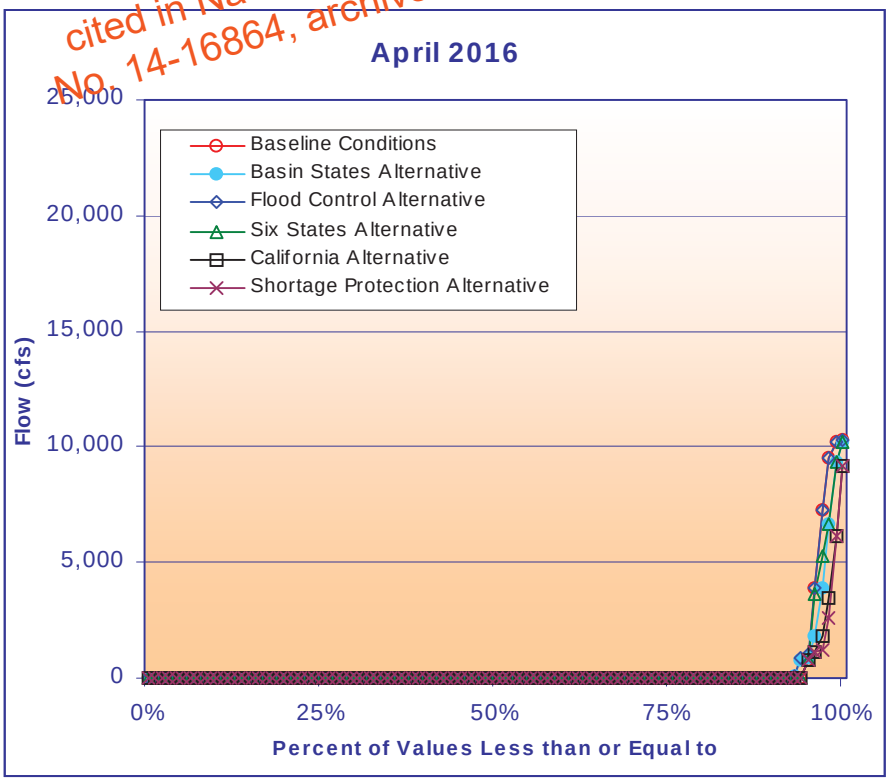
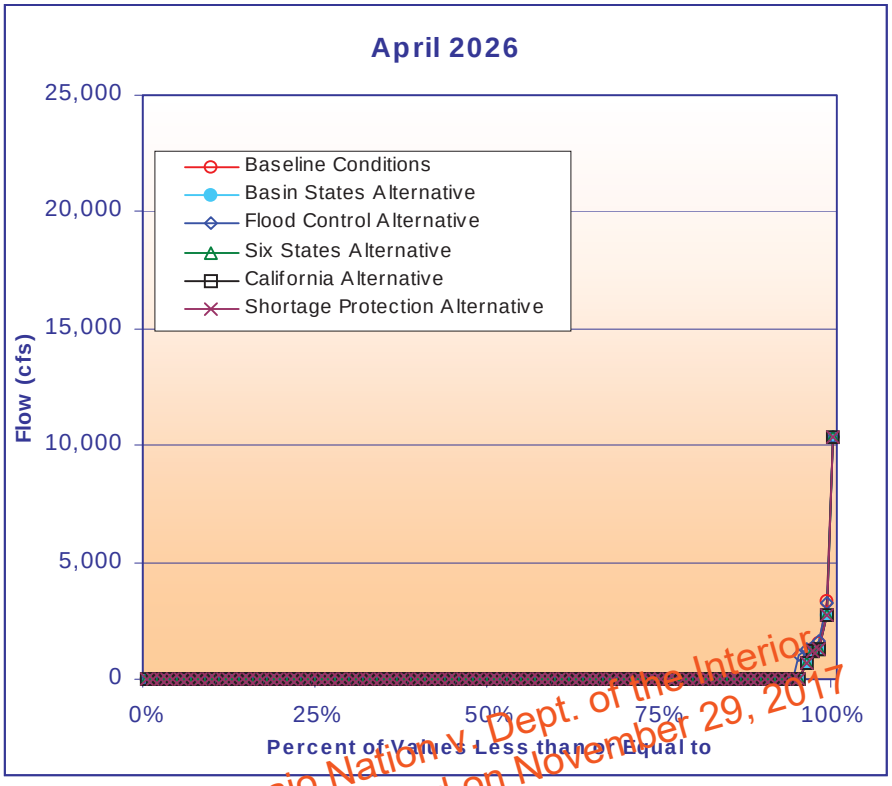


Figure N-14b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



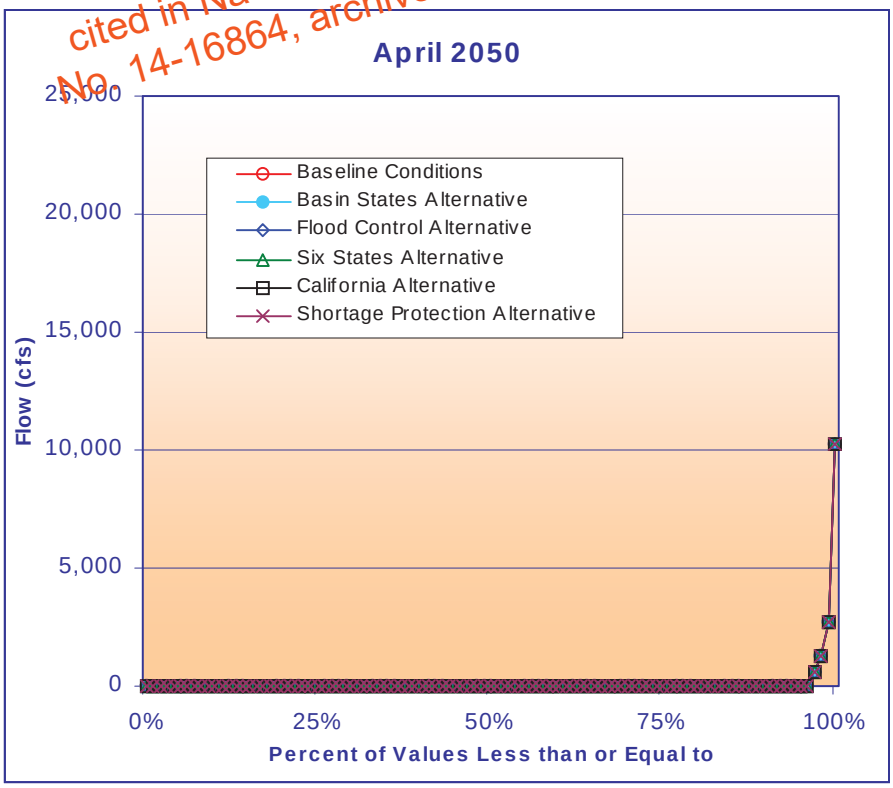
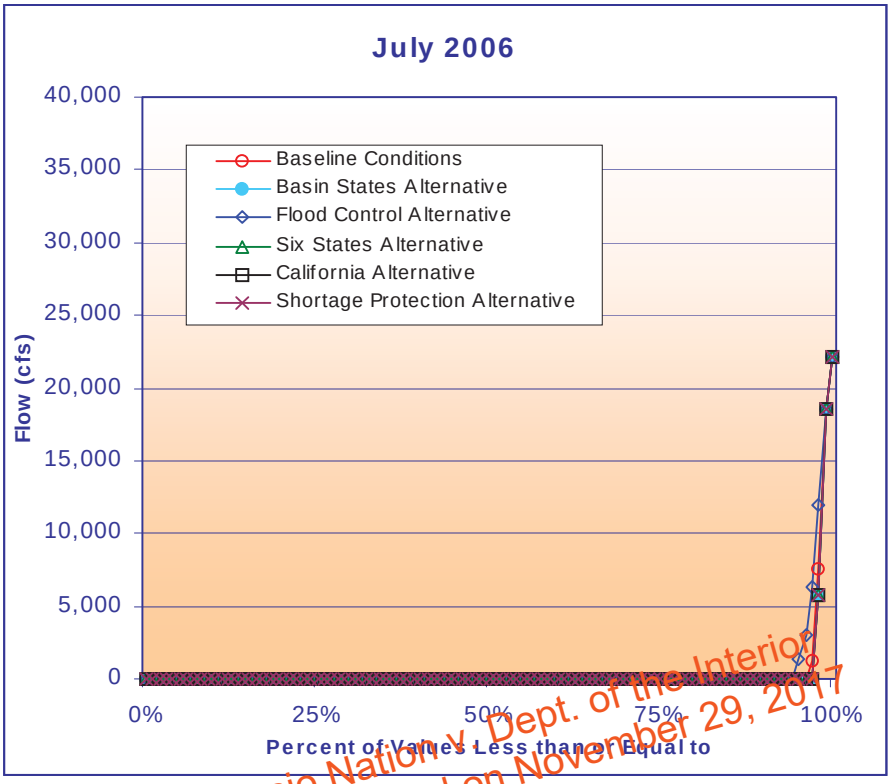


Figure N-15a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



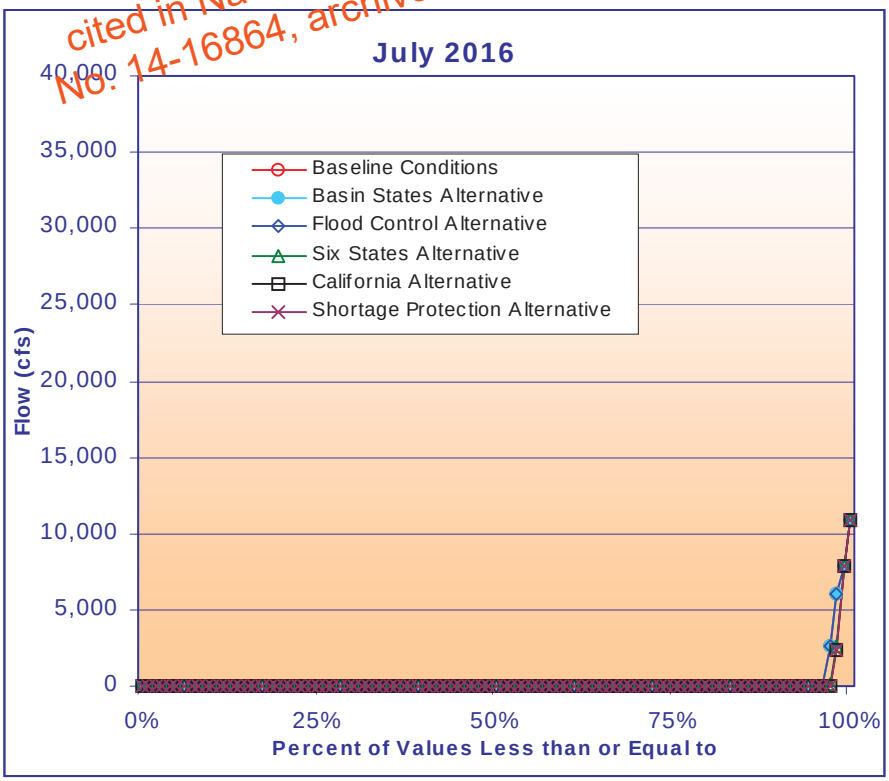
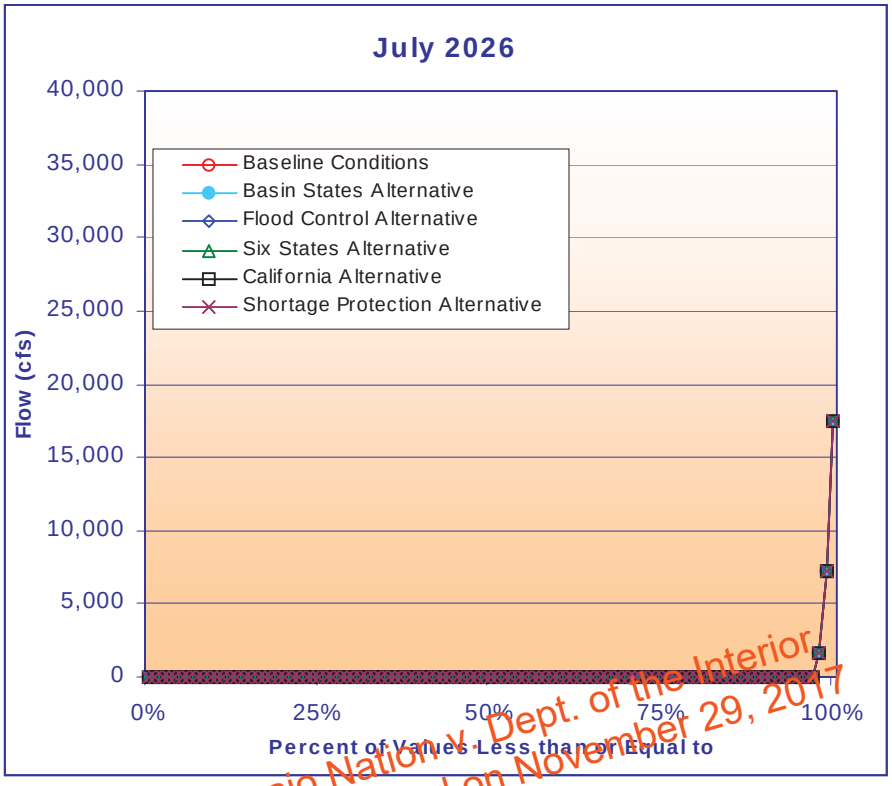


Figure N-15b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050



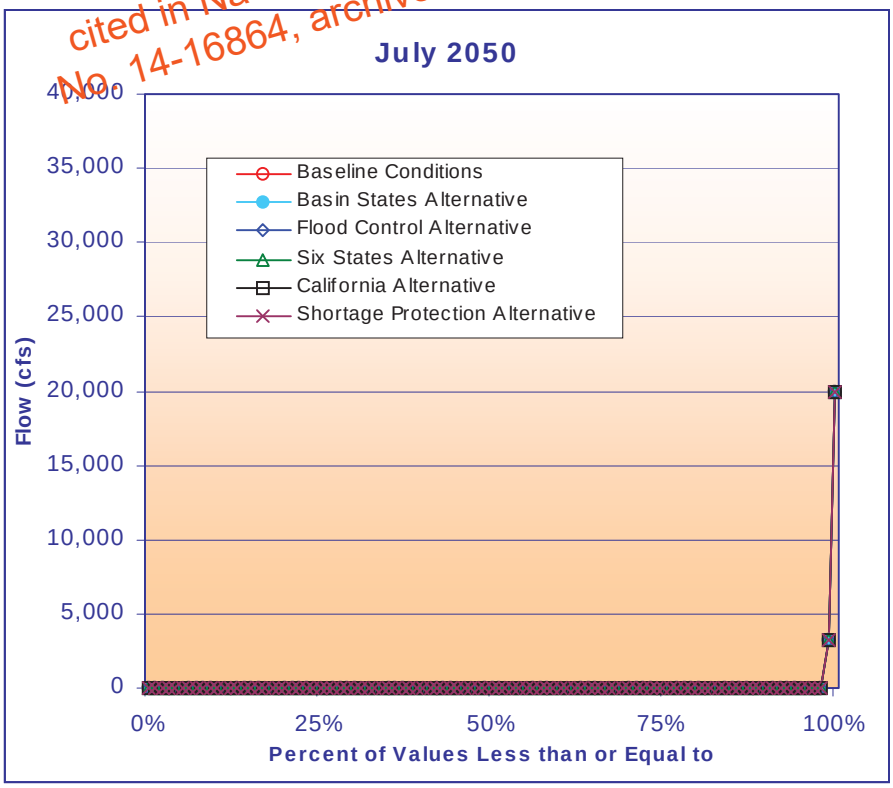
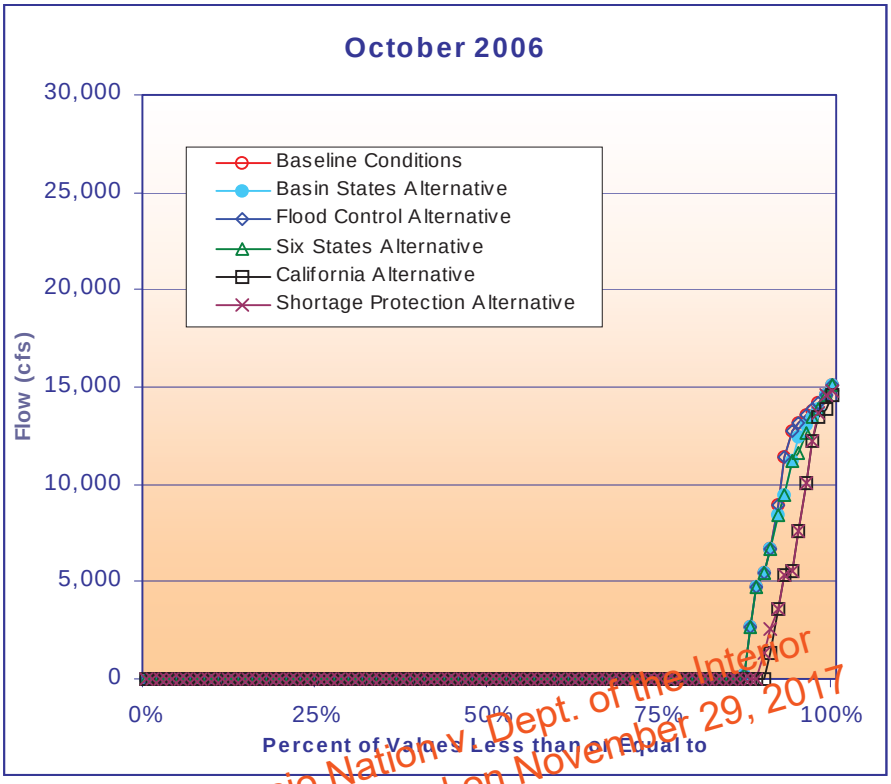


Figure N-16a
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2006 and 2016



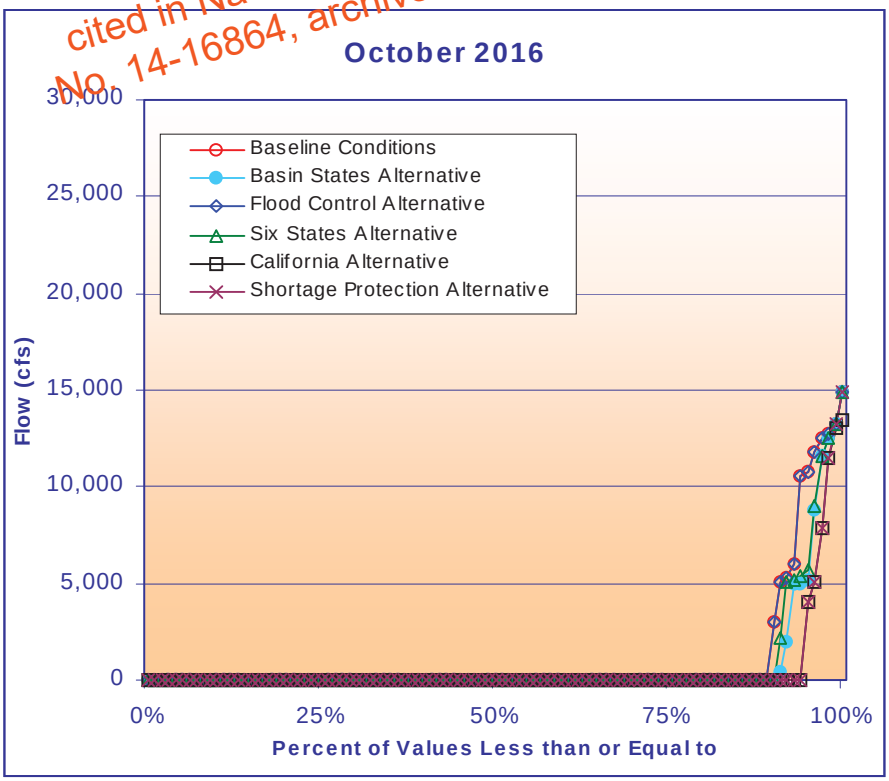
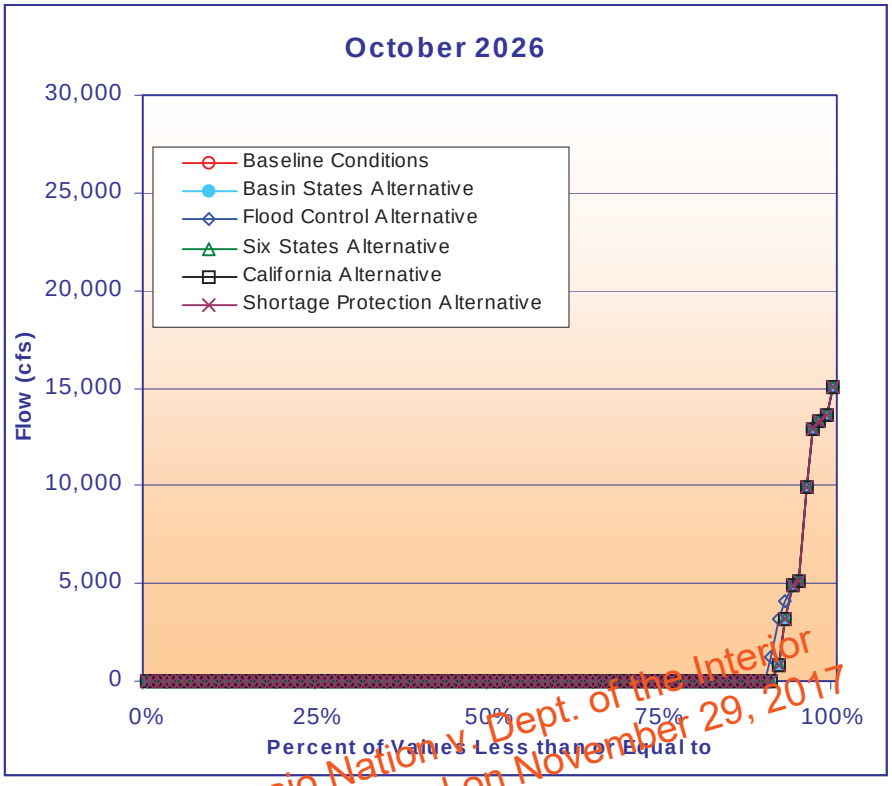
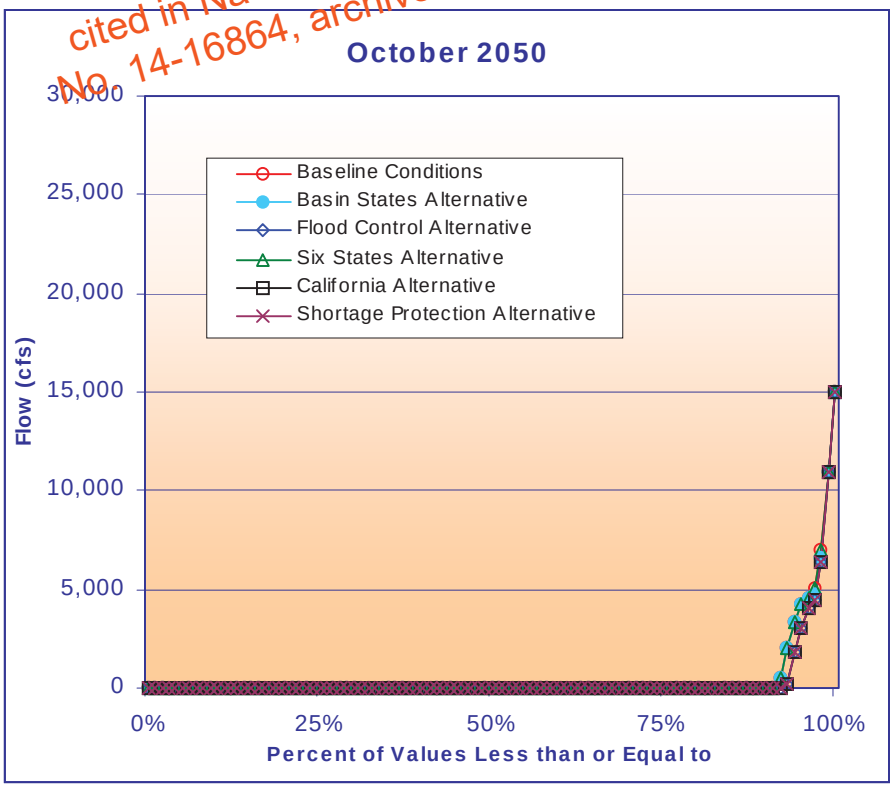


Figure N-16b
Colorado River Seasonal Flows Below Mexico Diversion at Morelos Dam
Comparison of Surplus Alternatives to Baseline Conditions for
Modeled Years 2026 and 2050





ATTACHMENT O

Water Supply for Lower Division States

This attachment presents additional plots of the projected amounts of water that would be available to each Lower Division state under baseline conditions and the interim surplus criteria alternatives. The plots show, for each year, the annual amount available (depletions) under the maximum; 90th, 50th, and 10th percentiles; and minimum values as discussed in Section 3.4, Water Supply.

Index of State Depletion Plots	
Figure	**Title**
O-1	Arizona Modeled Annual Depletions Under Baseline Conditions
O-2	Arizona Modeled Annual Depletions Under Basin States Alternative
O-3	Arizona Modeled Annual Depletions Under Flood Control Alternative
O-4	Arizona Modeled Annual Depletions Under Six States Alternative
O-5	Arizona Modeled Annual Depletions Under California Alternative
O-6	Arizona Modeled Annual Depletions Under Shortage Protection Alternative
O-7	California Modeled Annual Depletions Under Baseline Conditions
O-8	California Modeled Annual Depletions Under Basin States Alternative
O-9	California Modeled Annual Depletions Under Flood Control Alternative
O-10	California Modeled Annual Depletions Under Six States Alternative
O-11	California Modeled Annual Depletions Under California Alternative
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O-13	Nevada Modeled Annual Depletions Under Baseline Conditions
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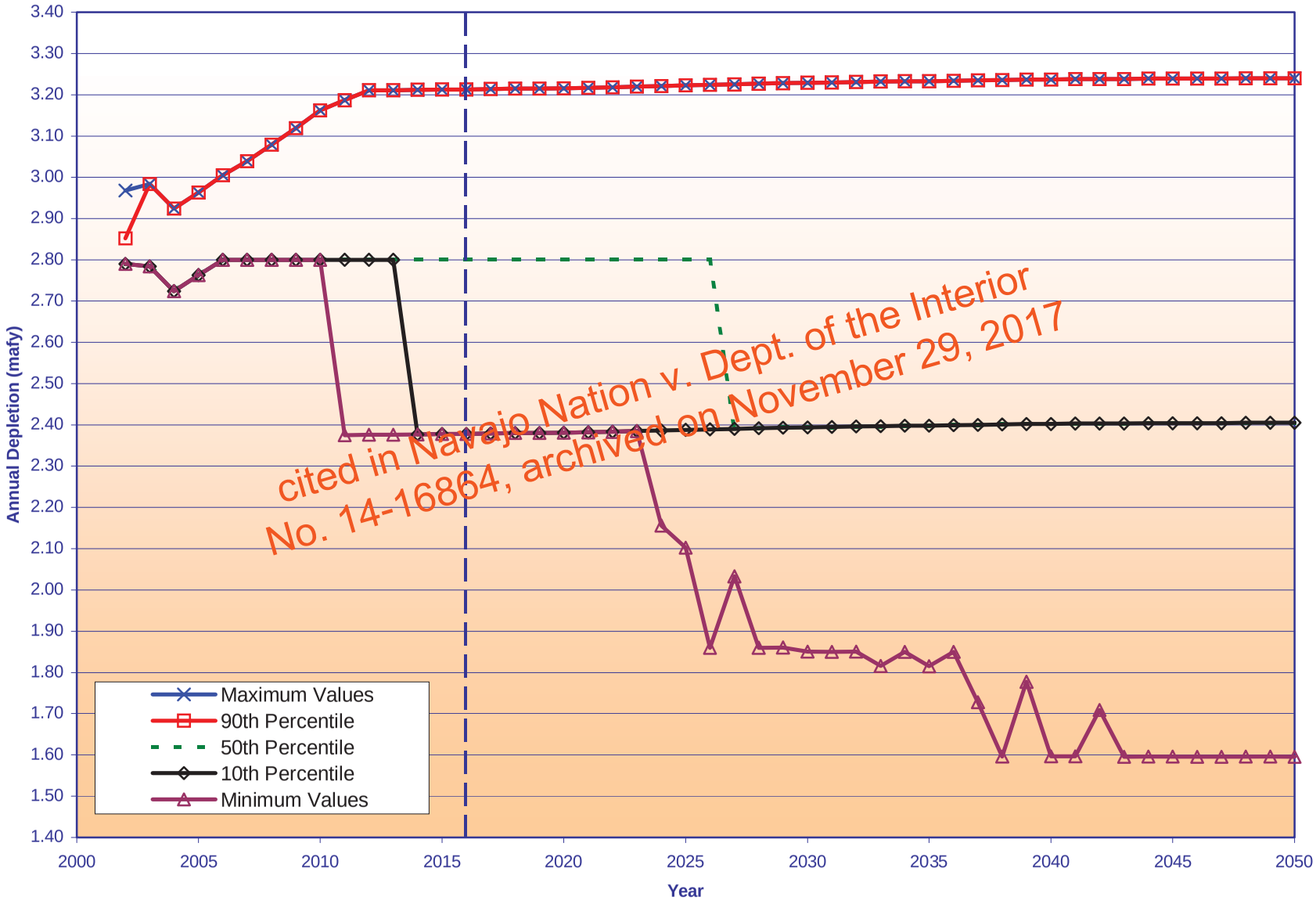
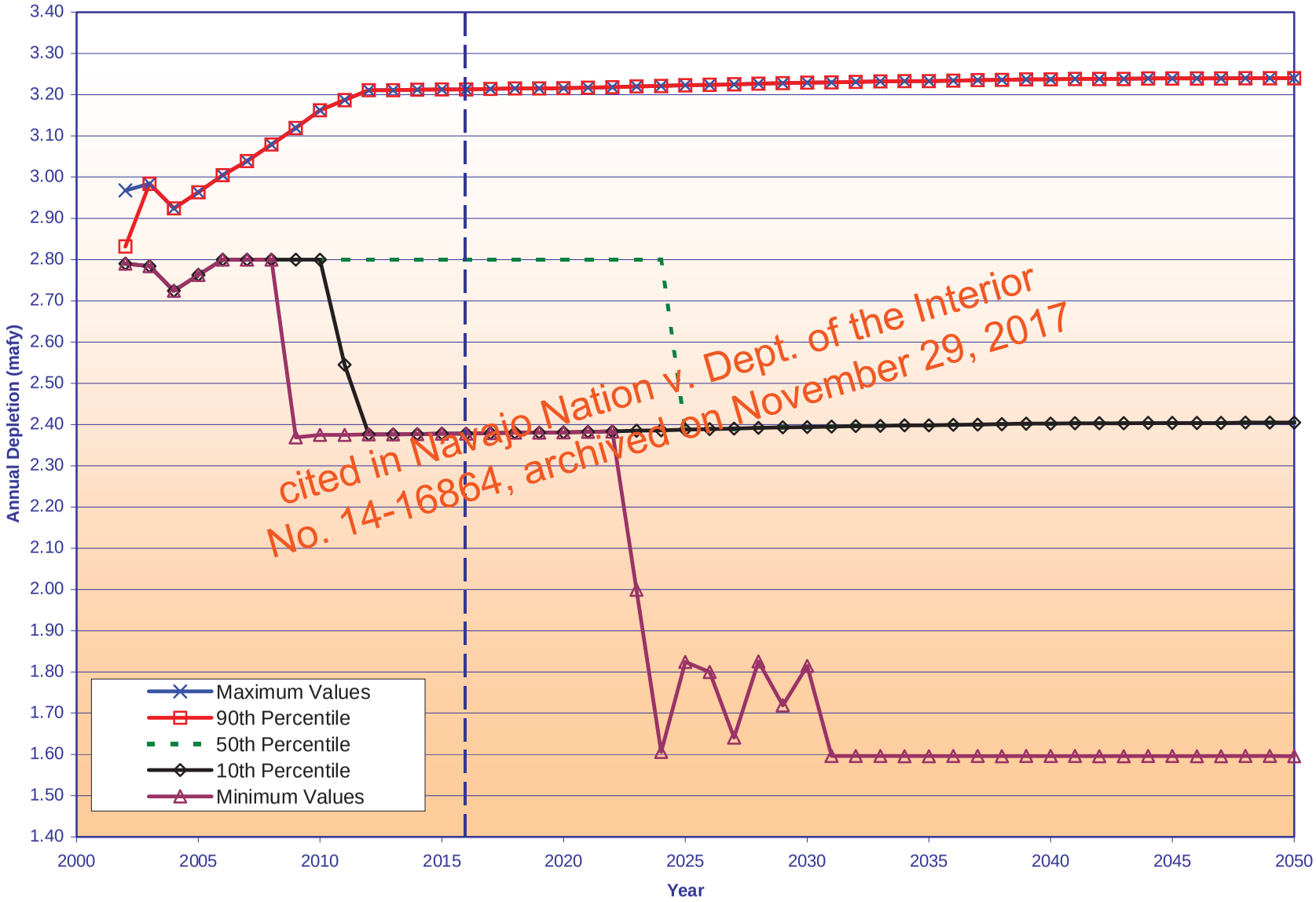
O-16	Nevada Modeled Annual Depletions Under Six States Alternative
O-17	Nevada Modeled Annual Depletions Under California Alternative
O-18	Nevada Modeled Annual Depletions Under Shortage Protection Alternative

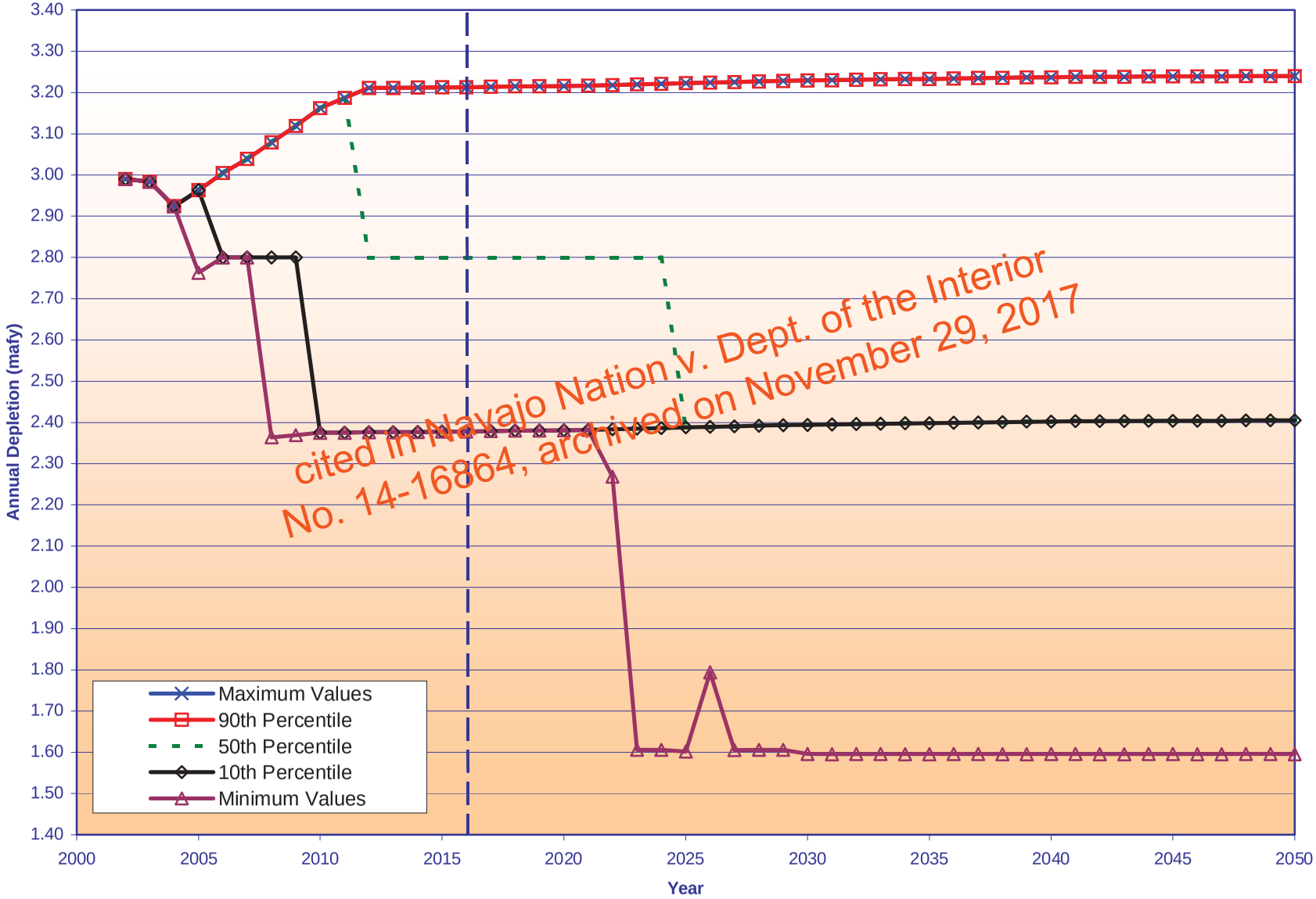
Attachment O-1
Arizona Modeled Annual Depletions Under Baseline Conditions
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



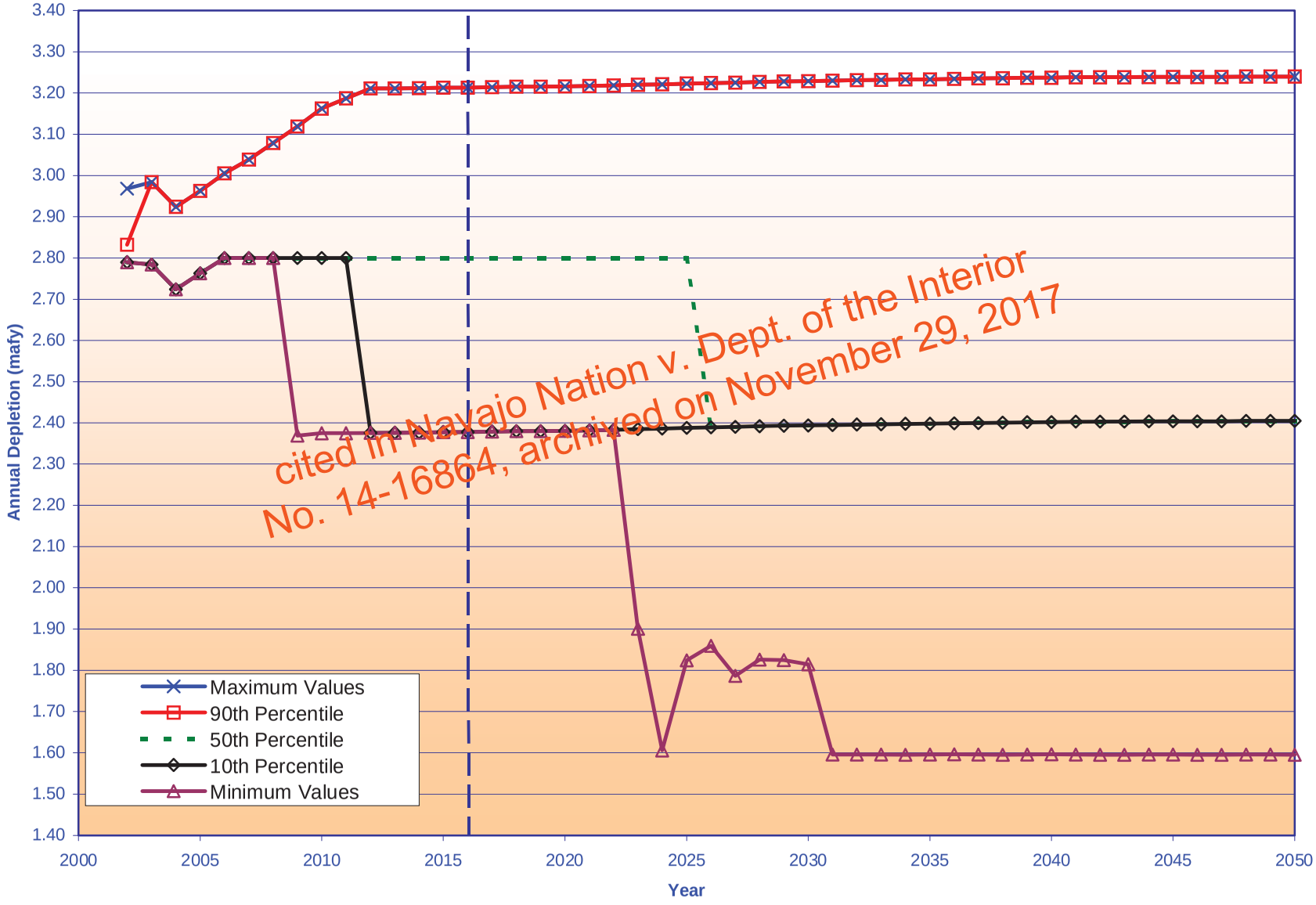
Attachment O-2
Arizona Modeled Annual Depletions Under Basin States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



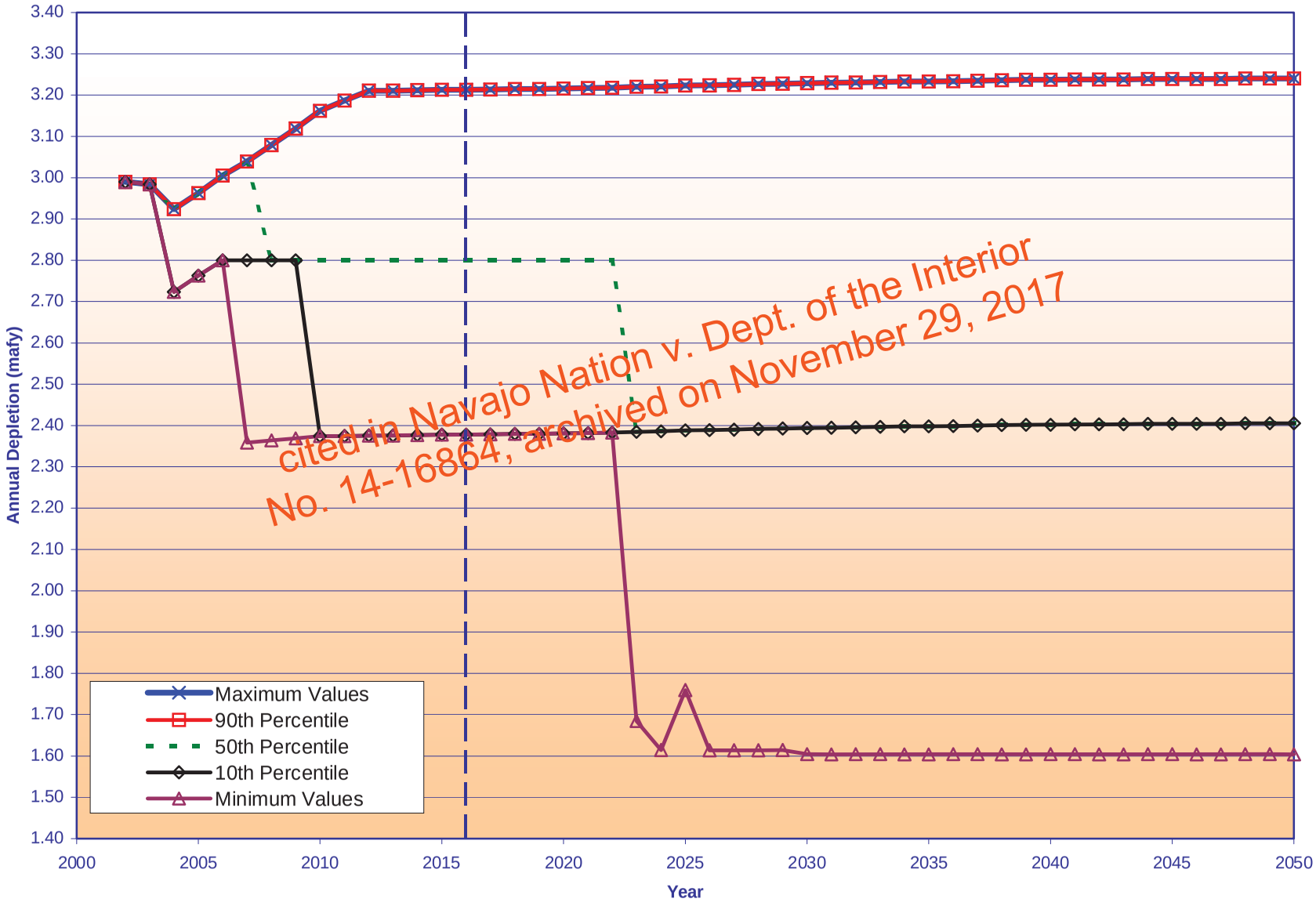
Attachment O-3
Arizona Modeled Annual Depletions Under Flood Control Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



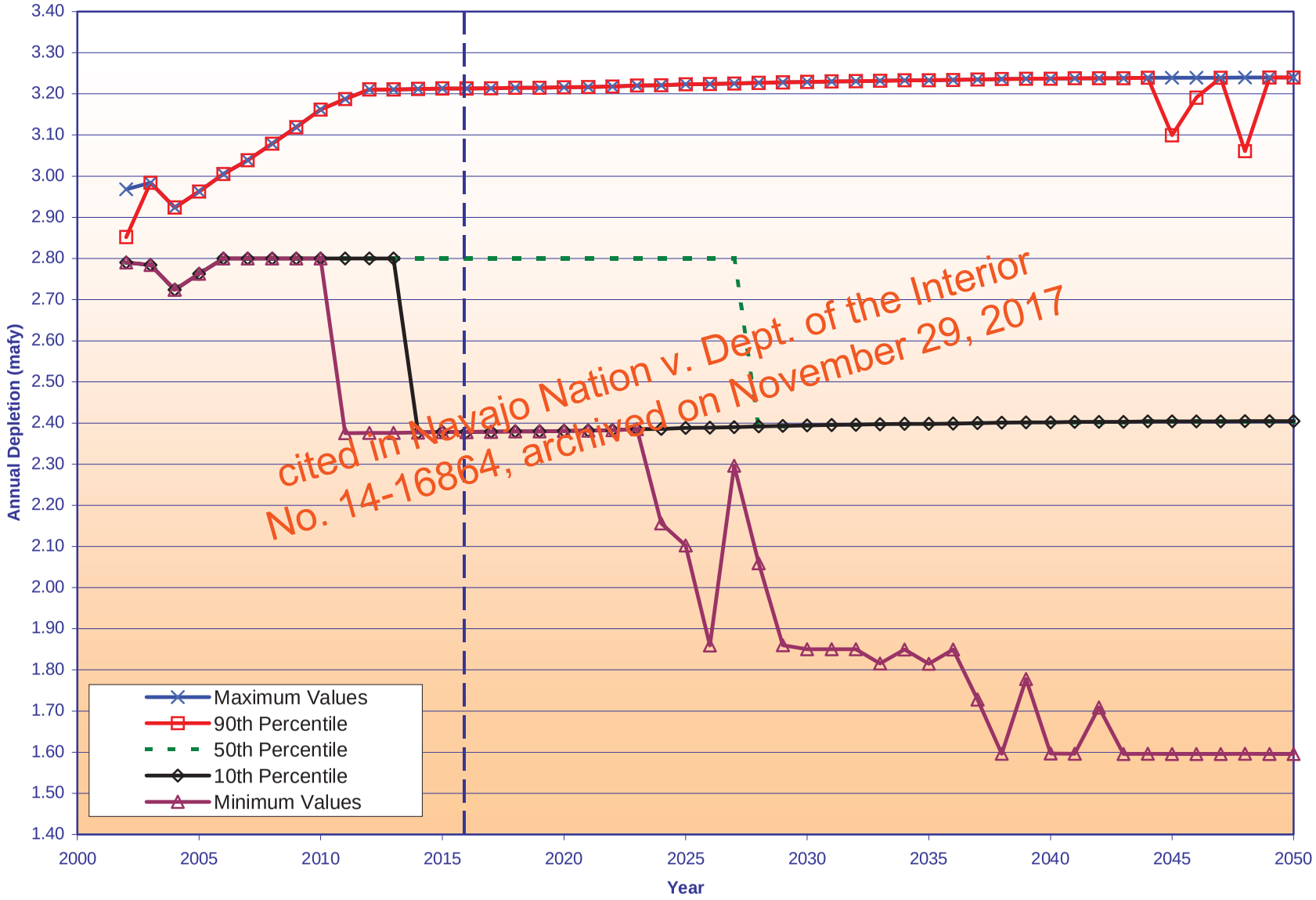
Attachment O-4
Arizona Modeled Annual Depletions Under Six States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



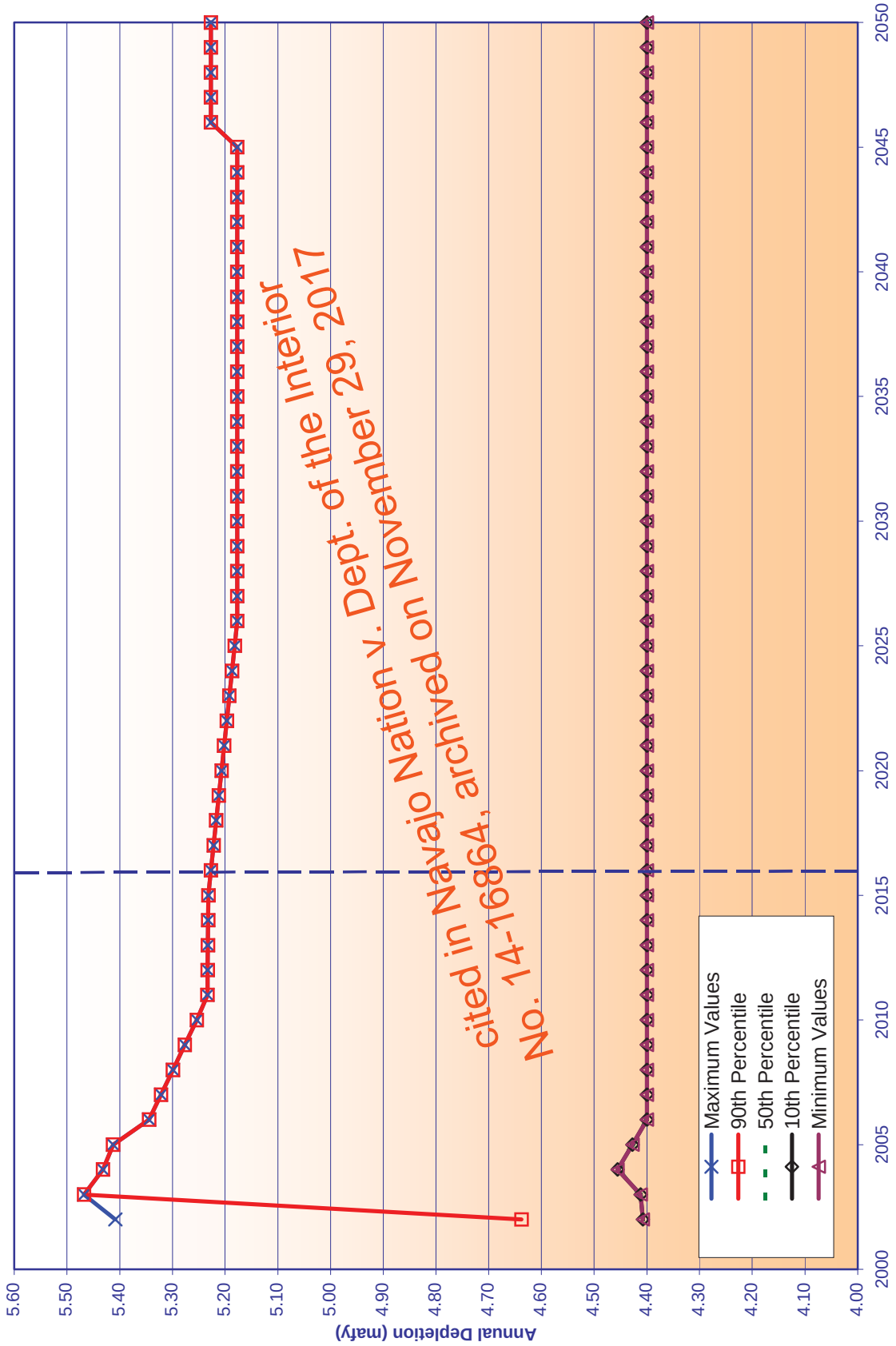
Attachment O-5
Arizona Modeled Annual Depletions Under California Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



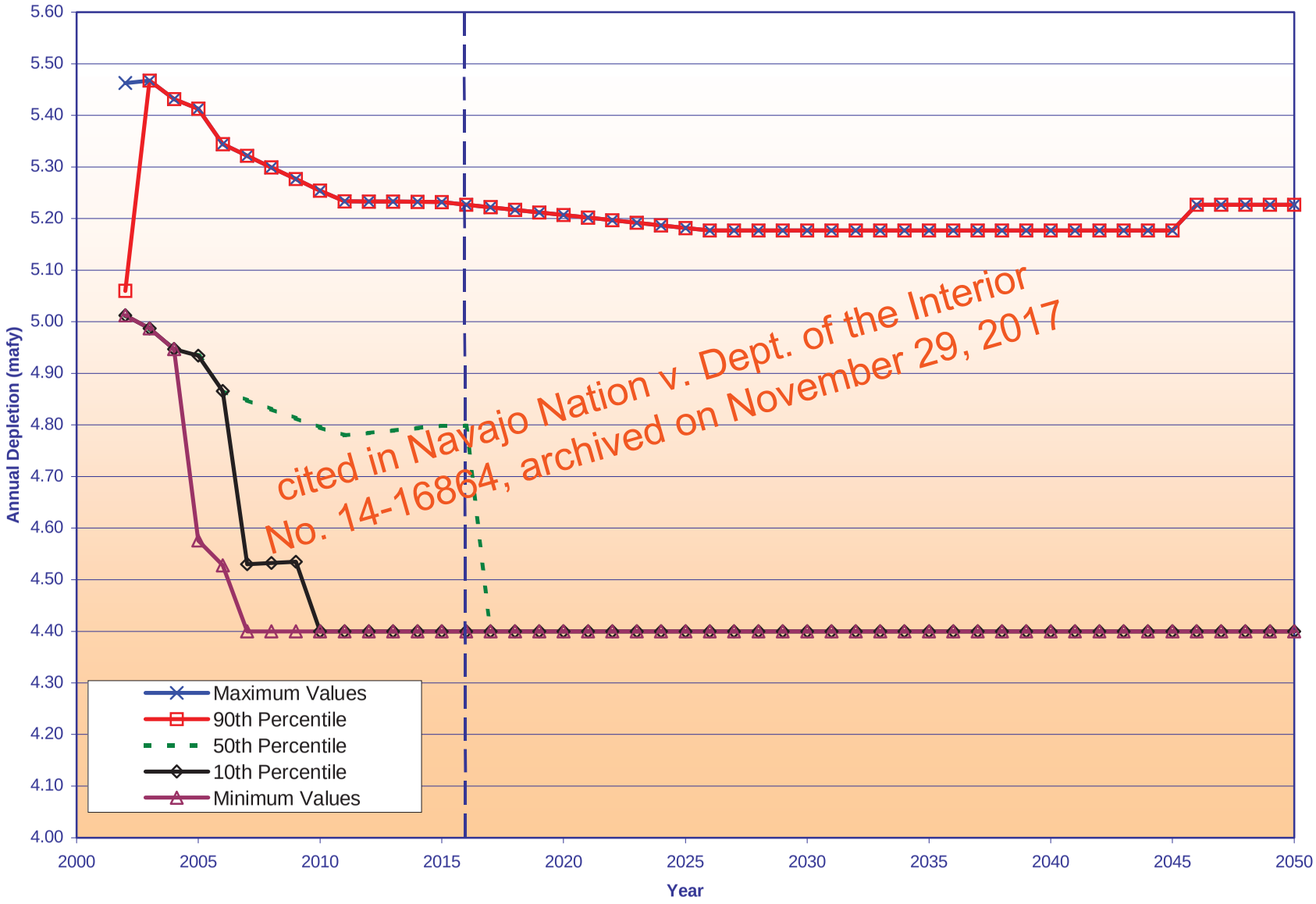
Attachment O-6
Arizona Modeled Annual Depletions Under Shortage Protection Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



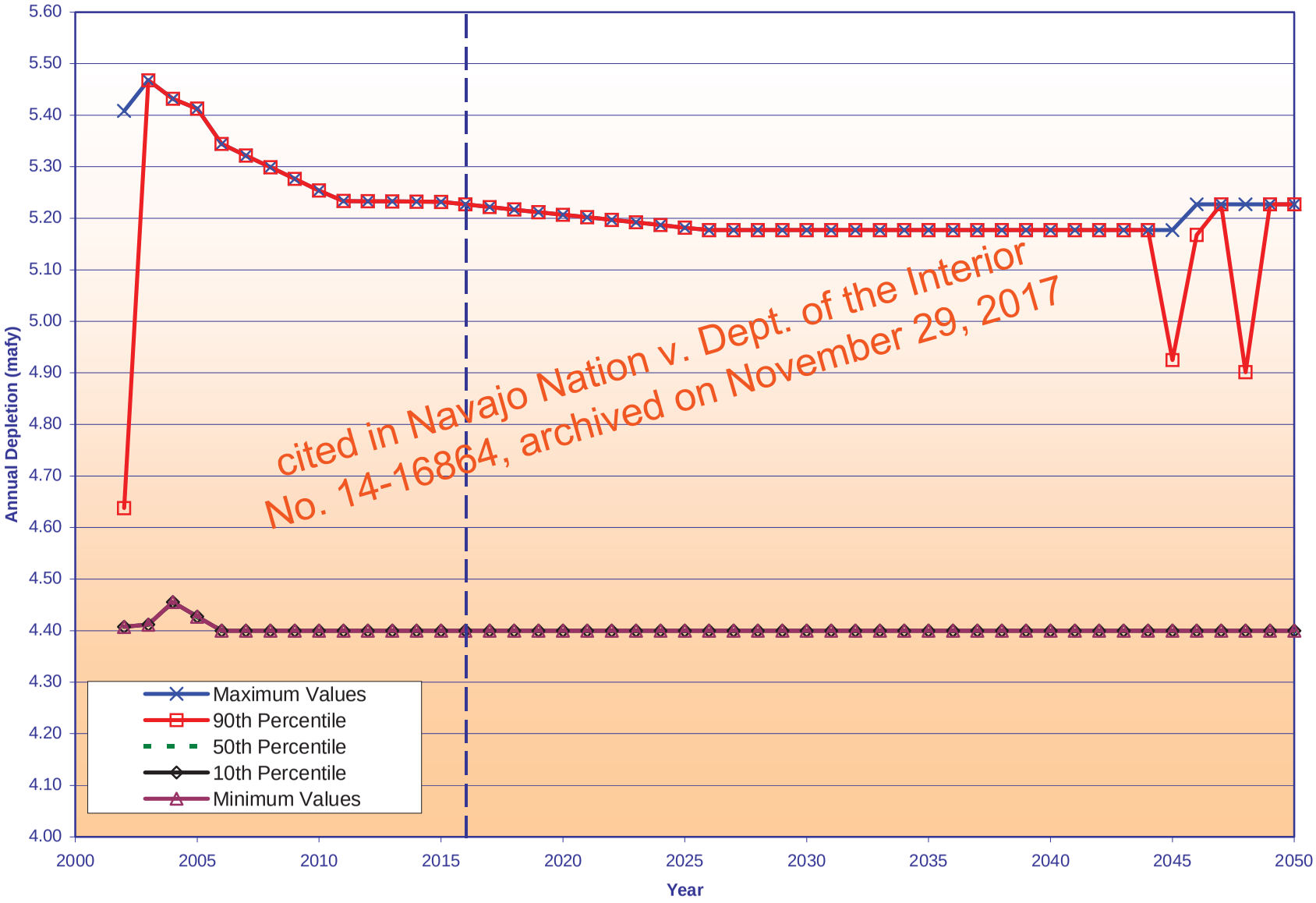
Attachment O-7
California Modeled Annual Depletions Under Baseline Conditions
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



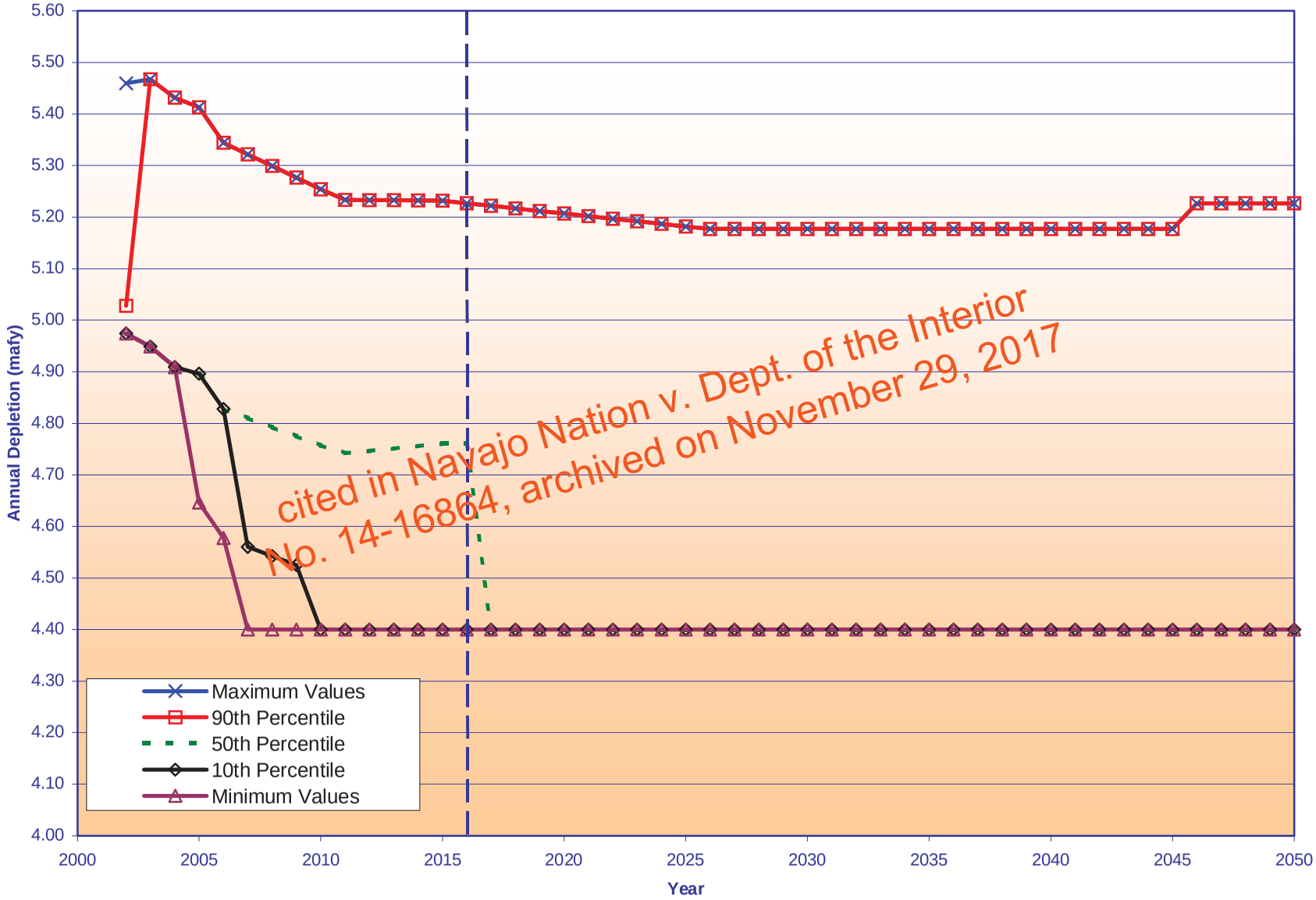
Attachment O-8
California Modeled Annual Depletions Under Basin States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



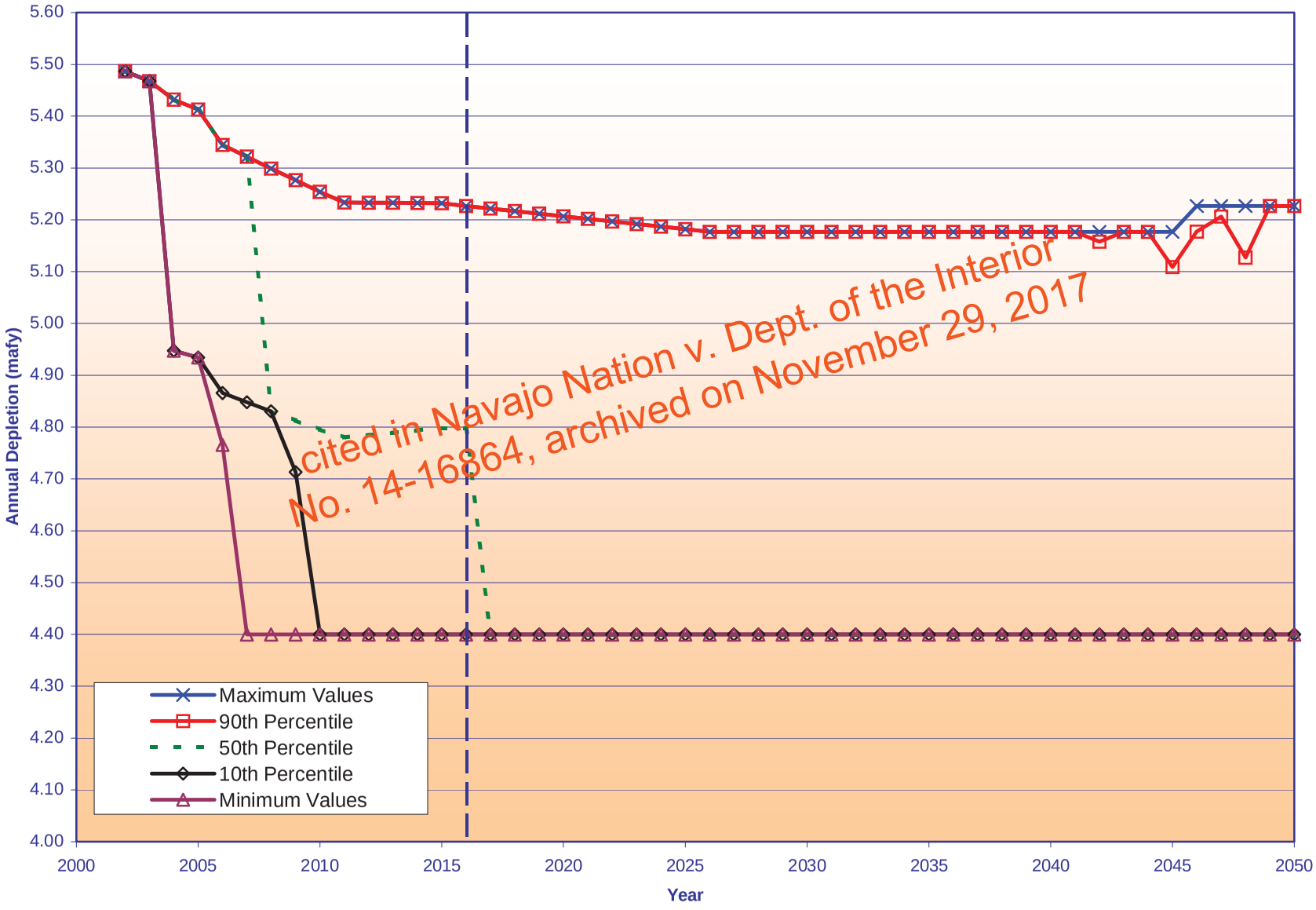
Attachment O-9
California Modeled Annual Depletions Under Flood Control Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



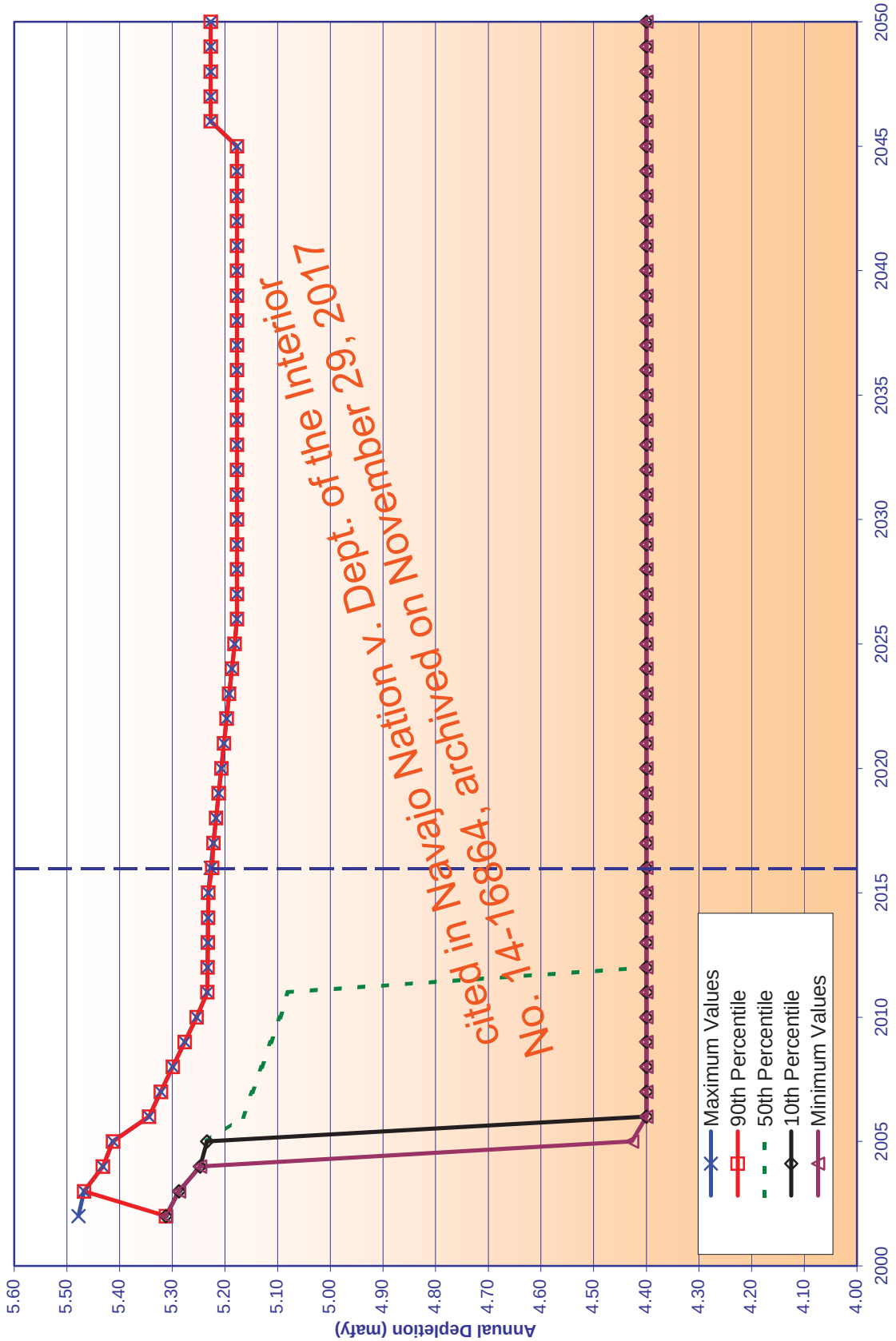
Attachment O-10
California Modeled Annual Depletions Under Six States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



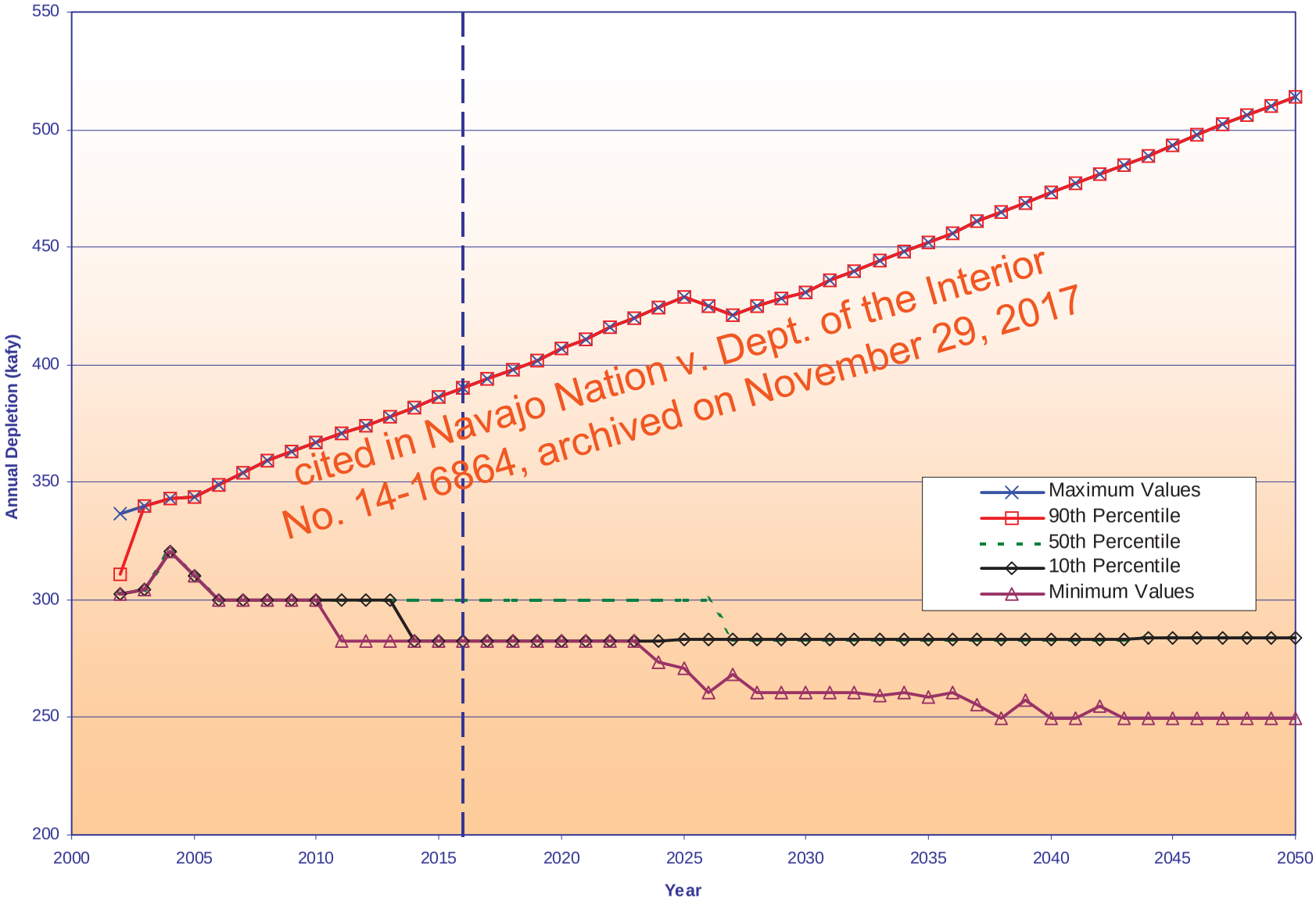
Attachment O-11
California Modeled Annual Depletions Under California Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



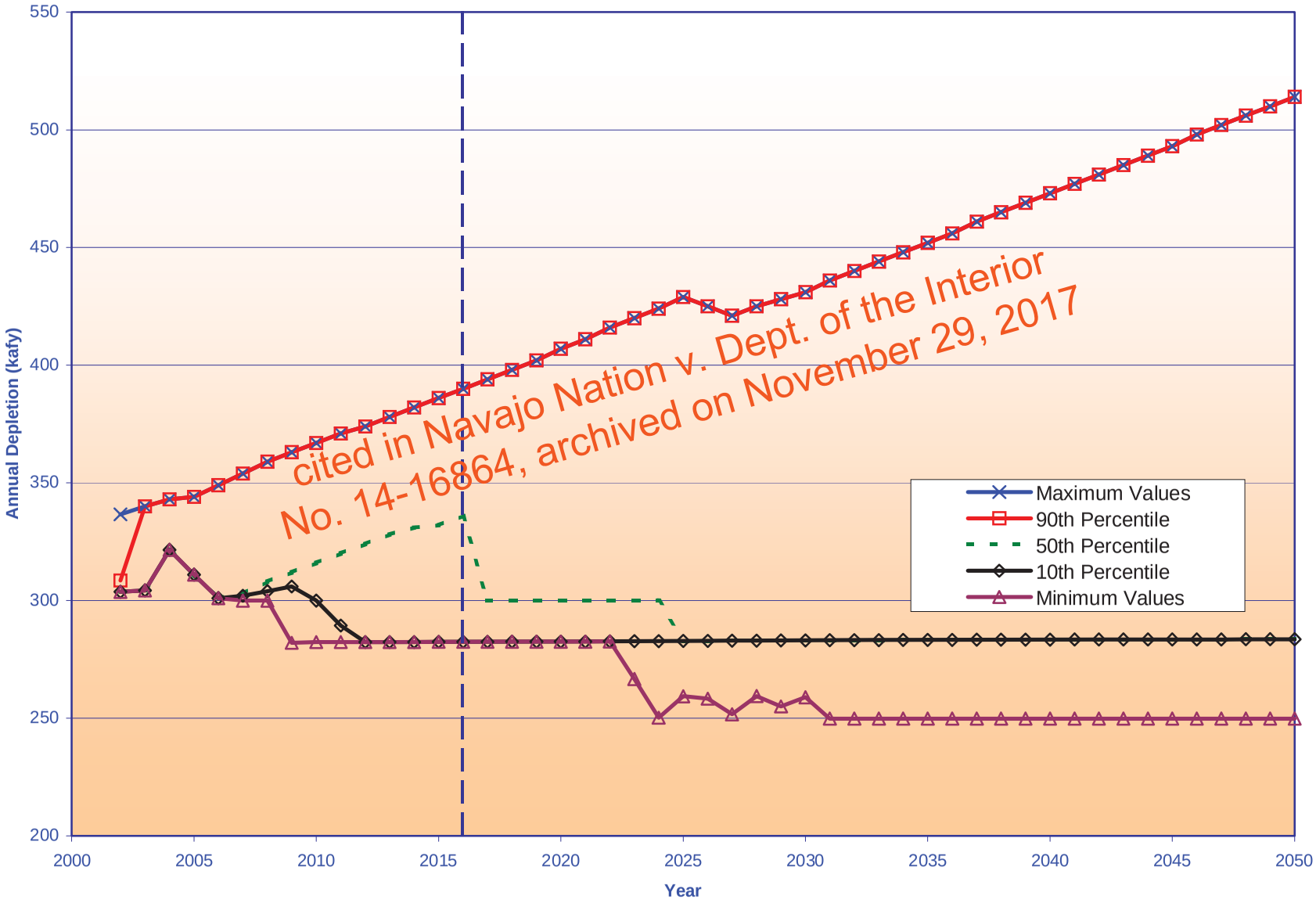
Attachment O-12
California Modeled Annual Depletions Under Shortage Protection Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



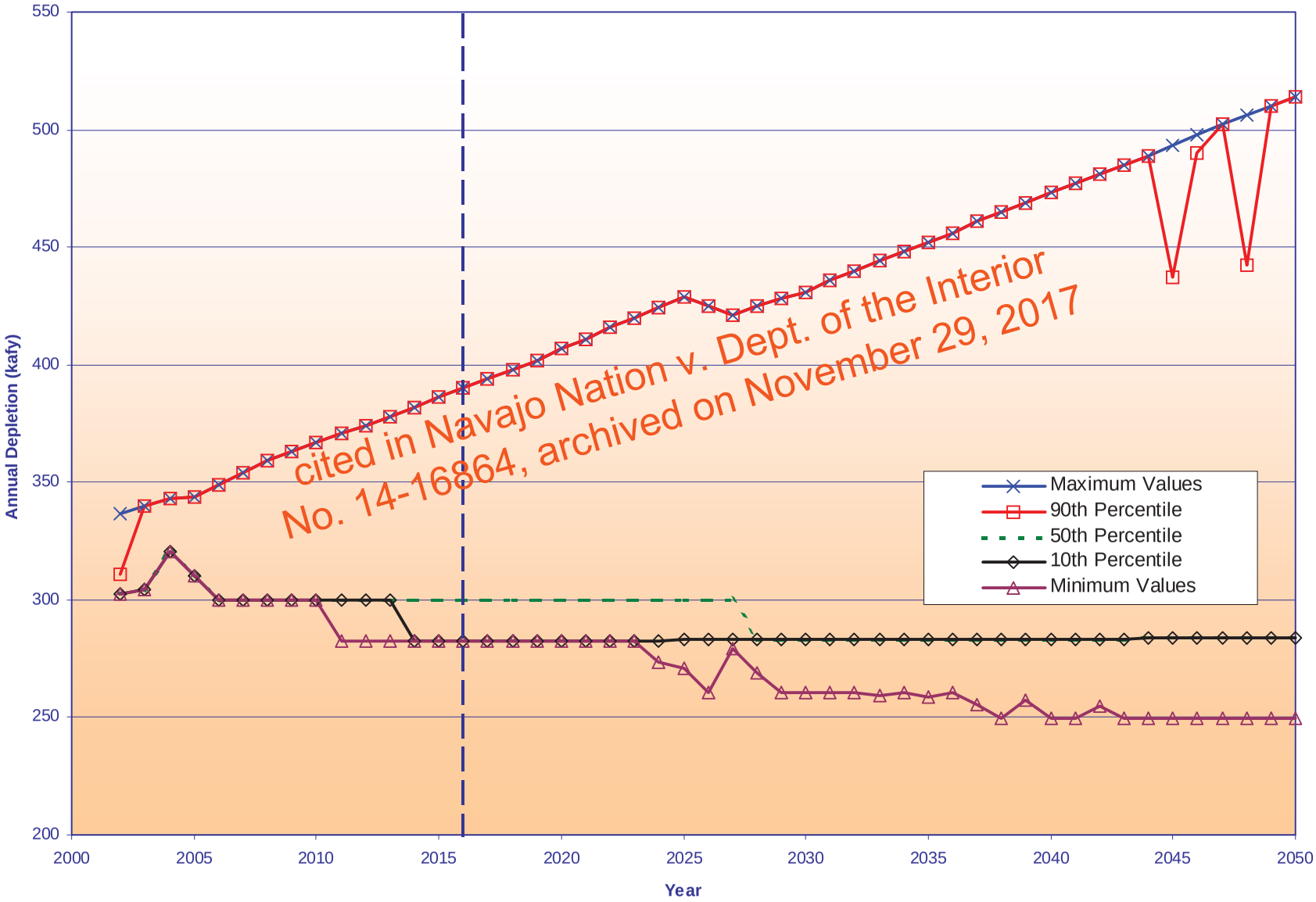
Attachment O-13
Nevada Modeled Annual Depletions Under Baseline Conditions
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



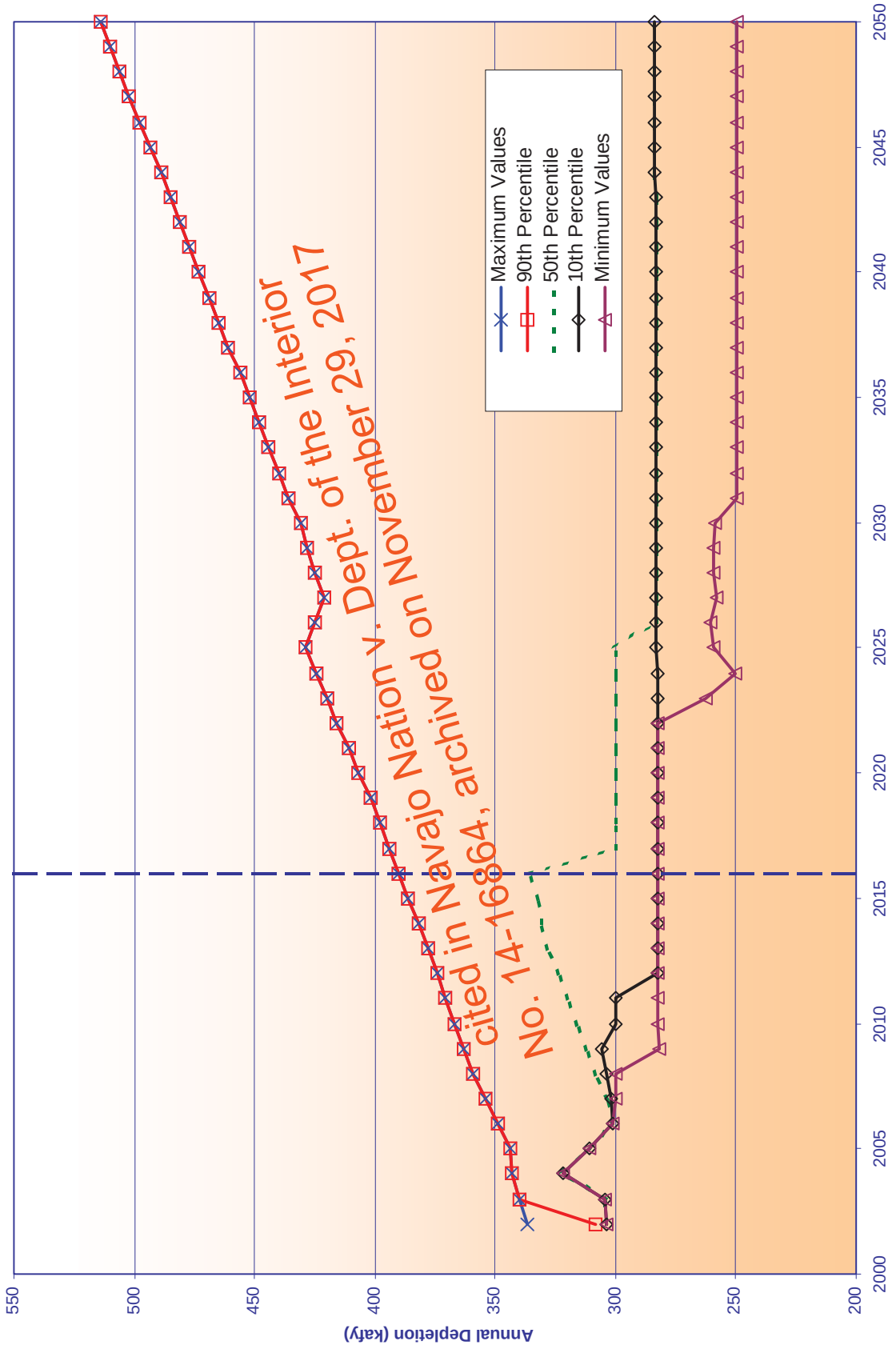
Attachment O-14
Nevada Modeled Annual Depletions Under Basin States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



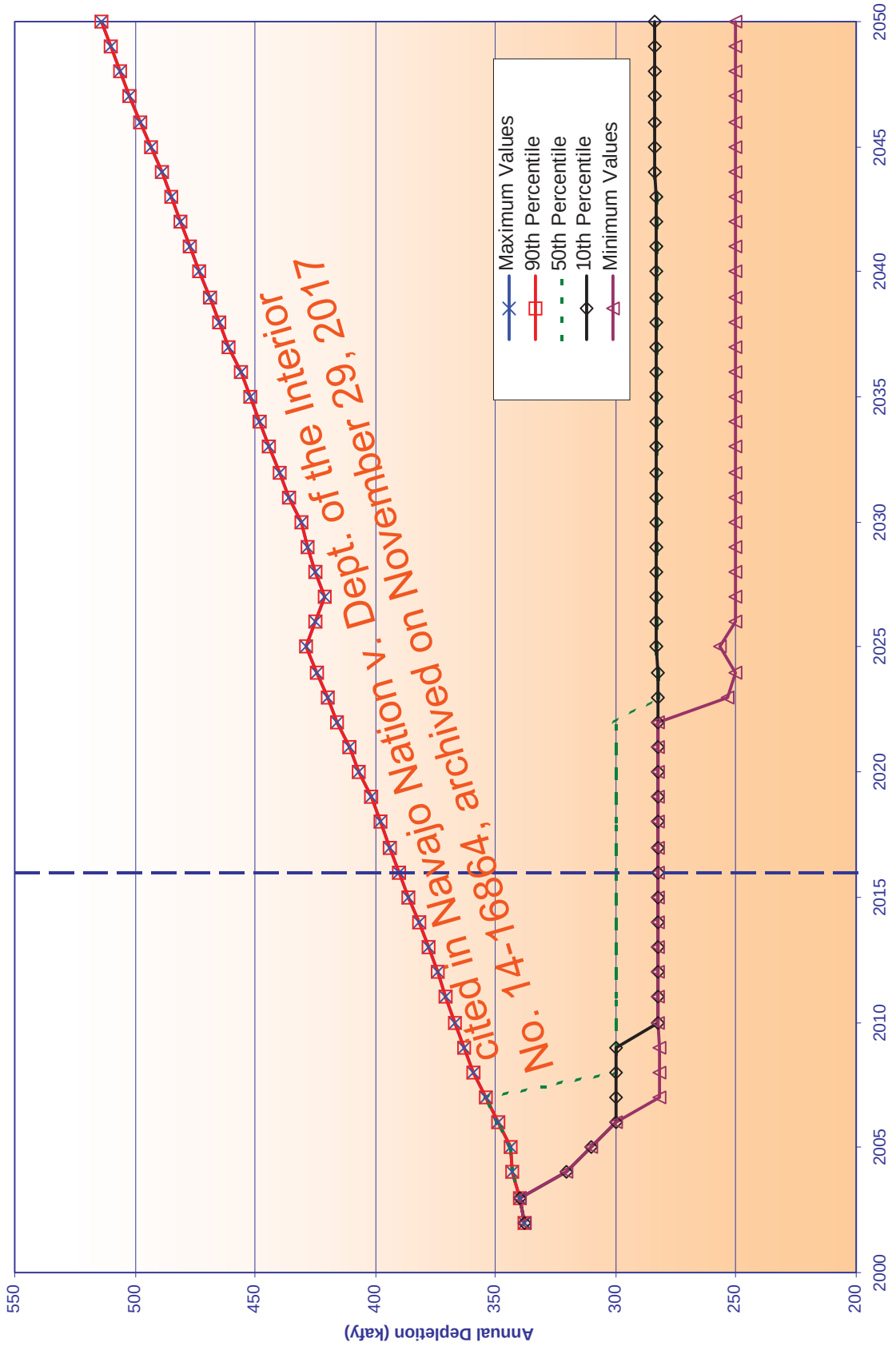
Attachment O-15
Nevada Modeled Annual Depletions Under Flood Control Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



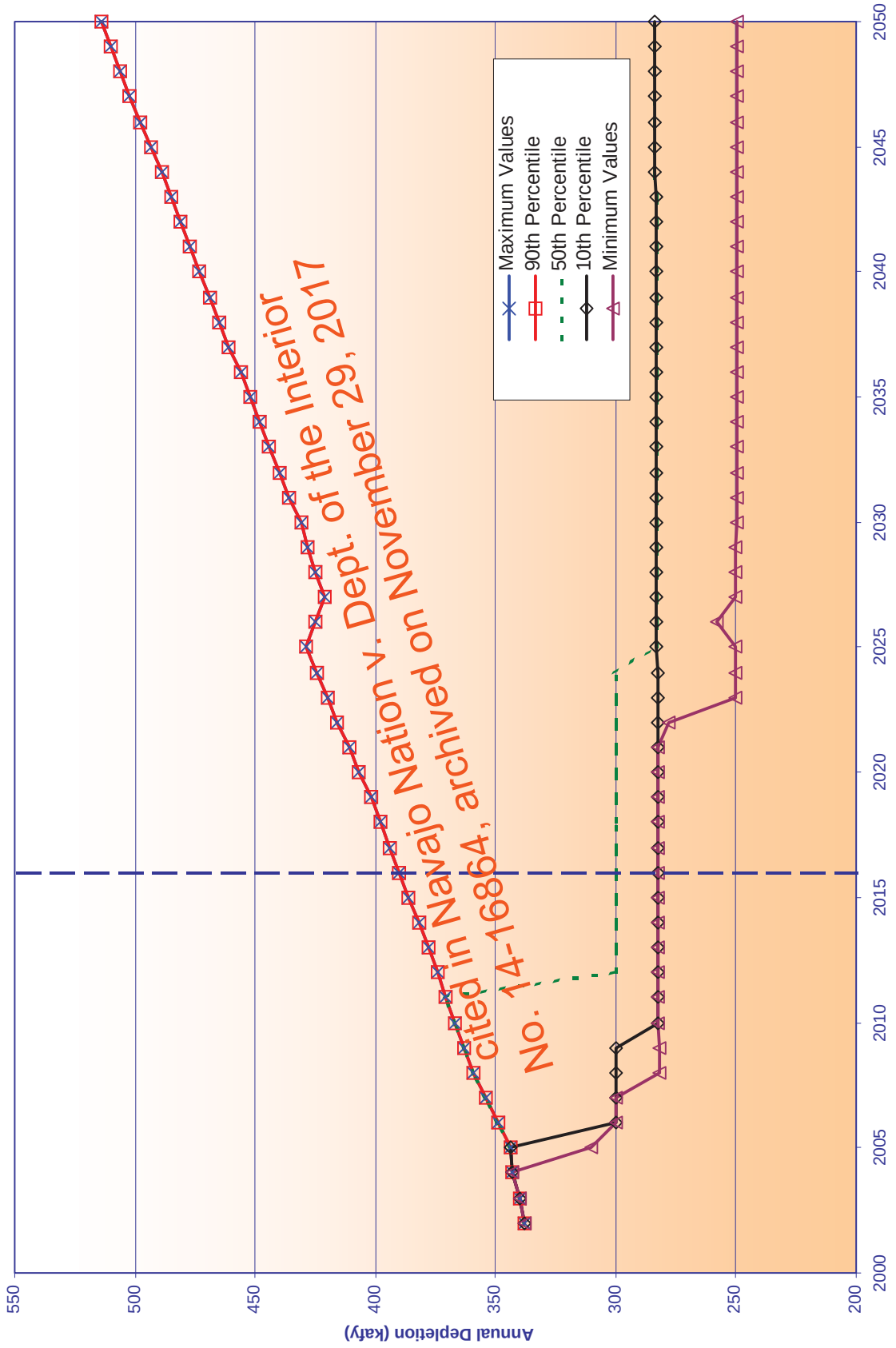
Attachment O-16
Nevada Modeled Annual Depletions Under Six States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



Attachment O-17
Nevada Modeled Annual Depletions Under California Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



Attachment O-18
Nevada Modeled Annual Depletions Under Six States Alternative
Maximum; 90th, 50th, and 10th Percentile; Minimum Values



ATTACHMENT P

Energy Analysis Worksheets

This attachment contains worksheets with calculations used for the energy resources analysis in this FEIS.

Table 1

Average Lake Powell Elevation

	Average Water Surface Elevation (feet msl)						Comparison to Baseline (feet msl)				
Year	Baseline Conditions	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative
2002	3,685	3,685	3,682	3,682	3,678	3,679	0	-3	-3	-6	-6
2003	3,685	3,685	3,682	3,682	3,678	3,679	0	-3	-3	-6	-6
2004	3,684	3,684	3,682	3,681	3,675	3,677	0	-3	-3	-9	-8
2005	3,683	3,683	3,678	3,677	3,671	3,672	0	-5	-5	-12	-11
2006	3,680	3,680	3,674	3,675	3,667	3,668	0	-6	-5	-13	-12
2007	3,679	3,679	3,672	3,672	3,663	3,664	0	-7	-7	-16	-15
2008	3,678	3,678	3,672	3,672	3,663	3,663	0	-6	-6	-15	-15
2009	3,676	3,676	3,669	3,669	3,660	3,660	0	-7	-7	-16	-16
2010	3,674	3,674	3,667	3,666	3,656	3,655	0	-7	-8	-18	-19
2011	3,670	3,670	3,663	3,662	3,653	3,652	0	-7	-8	-17	-18
2012	3,668	3,668	3,661	3,661	3,651	3,650	0	-7	-7	-16	-18
2013	3,661	3,661	3,653	3,652	3,650	3,649	0	-8	-9	-11	-12
2014	3,658	3,658	3,651	3,652	3,650	3,650	0	-7	-6	-8	-8
2015	3,655	3,655	3,652	3,652	3,651	3,650	0	-3	-3	-4	-4
2016	3,653	3,654	3,653	3,653	3,652	3,652	0	0	0	-2	-2
2017	3,655	3,655	3,654	3,654	3,652	3,652	0	-1	-1	-3	-3
2018	3,655	3,655	3,654	3,654	3,653	3,653	0	-1	-1	-2	-2
2019	3,656	3,656	3,655	3,655	3,655	3,655	0	-1	-1	-1	-1
2020	3,658	3,658	3,657	3,657	3,657	3,657	0	-1	-1	-1	-1
2021	3,658	3,658	3,658	3,658	3,658	3,658	0	0	0	0	0
2022	3,660	3,660	3,659	3,659	3,658	3,658	0	-1	-1	-2	-2
2023	3,660	3,660	3,659	3,659	3,659	3,659	0	-2	-2	-2	-2
2024	3,659	3,659	3,659	3,659	3,657	3,657	0	0	0	-2	-2
2025	3,661	3,661	3,661	3,661	3,660	3,660	0	0	0	-1	-1
2026	3,662	3,662	3,661	3,660	3,658	3,658	0	-1	-1	-4	-4
2027	3,662	3,662	3,658	3,658	3,658	3,658	0	-4	-4	-4	-4
2028	3,659	3,659	3,659	3,659	3,659	3,659	0	0	0	0	0
2029	3,660	3,660	3,660	3,660	3,660	3,660	0	0	0	0	0
2030	3,661	3,661	3,661	3,661	3,661	3,661	0	0	0	0	0
2031	3,661	3,661	3,661	3,661	3,661	3,661	0	0	0	0	0
2032	3,663	3,663	3,663	3,663	3,663	3,663	0	0	0	0	0
2033	3,664	3,664	3,664	3,664	3,664	3,664	0	0	0	0	0
2034	3,664	3,664	3,664	3,664	3,664	3,664	0	0	0	0	0
2035	3,665	3,665	3,665	3,665	3,665	3,665	0	0	0	0	0
2036	3,666	3,666	3,666	3,666	3,666	3,666	0	0	0	0	0
2037	3,666	3,666	3,666	3,666	3,666	3,666	0	0	0	0	0
2038	3,668	3,668	3,668	3,668	3,668	3,668	0	0	0	0	0
2039	3,668	3,668	3,668	3,668	3,668	3,668	0	0	0	0	0
2040	3,667	3,667	3,667	3,667	3,667	3,667	0	0	0	0	0
2041	3,669	3,669	3,668	3,668	3,667	3,667	0	0	0	-1	-1
2042	3,667	3,667	3,667	3,667	3,666	3,666	0	0	-1	-2	-2
2043	3,668	3,667	3,668	3,668	3,668	3,668	0	0	0	0	0
2044	3,666	3,666	3,666	3,666	3,666	3,666	0	0	0	0	0
2045	3,664	3,664	3,663	3,663	3,663	3,663	0	-2	-2	-2	-2
2046	3,665	3,666	3,665	3,665	3,665	3,665	1	0	0	0	0
2047	3,662	3,662	3,662	3,662	3,662	3,662	0	0	0	0	0
2048	3,662	3,662	3,662	3,662	3,662	3,662	0	0	0	0	0
2049	3,660	3,660	3,660	3,660	3,660	3,660	0	0	0	0	0
2050	3,661	3,661	3,661	3,661	3,661	3,661	0	0	0	0	0
AVERAGE:											
2002-2016	3,672	3,673	3,667	3,667	3,661	3,661	0	-5	-5	-11	-11
2017-2050	3,662	3,662	3,662	3,662	3,662	3,662	0	0	0	-1	-1
2002-2050	3,666	3,666	3,664	3,664	3,662	3,662	0	-2	-2	-4	-4

Table 2

Average Lake Mead Elevation and Comparison of SNWA Pumping Power Costs

	Average Water Surface Elevation (feet msl)						Comparison to Baseline (feet msl)					Pumping Power Cost Comparison to Baseline				
Year	Baseline Conditions	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative	Flood Control Alternative	Six States Alternative	Basin States Alternative	California Alternative	Shortage Protection Alternative
2002	1,191	1,191	1,187	1,187	1,182	1,183	0	-4	-4	-9	-8	$0	$117,320	$124,320	$253,120	$222,600
2003	1,191	1,191	1,187	1,187	1,182	1,183	0	-4	-4	-9	-8	$0	$117,320	$124,320	$253,120	$222,600
2004	1,189	1,192	1,186	1,186	1,178	1,180	2	-3	-3	-11	-9	-$67,480	$81,200	$92,960	$305,760	$251,720
2005	1,190	1,191	1,183	1,184	1,176	1,178	1	-6	-5	-14	-12	-$24,920	$178,640	$152,880	$392,840	$330,400
2006	1,184	1,187	1,179	1,180	1,169	1,170	2	-5	-5	-16	-14	-$68,040	$150,920	$130,480	$434,560	$395,080
2007	1,182	1,183	1,176	1,176	1,167	1,168	1	-6	-6	-15	-14	-$28,840	$167,720	$175,000	$424,760	$404,040
2008	1,183	1,183	1,176	1,175	1,166	1,164	0	-7	-8	-17	-19	$0	$186,480	$210,000	$475,440	$536,200
2009	1,179	1,179	1,173	1,172	1,161	1,163	0	-6	-7	-19	-16	$280	$170,240	$191,240	$518,000	$453,320
2010	1,180	1,180	1,171	1,171	1,159	1,154	1	-9	-9	-21	-25	-$16,520	$248,640	$246,680	$575,960	$703,920
2011	1,175	1,175	1,168	1,167	1,152	1,151	0	-8	-8	-23	-24	-$3,640	$212,240	$235,760	$636,160	$666,400
2012	1,174	1,175	1,164	1,163	1,151	1,149	1	-10	-11	-23	-26	-$19,040	$281,120	$309,680	$652,400	$715,400
2013	1,169	1,172	1,158	1,158	1,145	1,143	3	-11	-11	-24	-26	-$75,040	$301,840	$307,720	$681,520	$734,720
2014	1,166	1,172	1,157	1,156	1,135	1,142	7	-9	-10	-30	-23	-$187,040	$251,160	$266,000	$843,920	$651,000
2015	1,170	1,170	1,157	1,155	1,136	1,139	0	-12	-14	-33	-31	$0	$346,640	$404,040	$932,680	$854,560
2016	1,163	1,163	1,149	1,146	1,135	1,133	0	-15	-17	-28	-30	$0	$410,200	$469,840	$792,400	$847,560
2017	1,160	1,160	1,146	1,144	1,131	1,130	0	-14	-16	-29	-30	$0	$394,520	$450,520	$808,080	$851,760
2018	1,156	1,157	1,139	1,137	1,129	1,136	1	-17	-19	-27	-20	-$21,840	$464,240	$527,800	$752,920	$552,440
2019	1,152	1,152	1,141	1,138	1,127	1,131	0	-11	-14	-25	-21	$0	$313,040	$378,840	$686,840	$580,440
2020	1,152	1,152	1,138	1,142	1,127	1,131	0	-13	-9	-25	-20	$0	$370,720	$255,920	$696,360	$568,680
2021	1,144	1,144	1,135	1,135	1,123	1,127	0	-9	-9	-21	-17	$0	$258,720	$264,600	$598,640	$479,920
2022	1,141	1,141	1,131	1,132	1,122	1,125	0	-10	-9	-19	-16	$0	$286,720	$256,760	$535,920	$444,360
2023	1,136	1,136	1,129	1,128	1,118	1,126	0	-7	-8	-18	-10	$0	$200,200	$213,360	$493,080	$266,280
2024	1,135	1,135	1,131	1,131	1,119	1,128	0	-4	-4	-16	-7	-$9,520	$111,160	$120,680	$452,200	$197,400
2025	1,134	1,133	1,128	1,128	1,119	1,123	-1	-6	-7	-15	-12	$28,280	$189,840	$182,280	$424,200	$327,040
2026	1,131	1,132	1,128	1,128	1,118	1,128	0	-4	-4	-13	-13	-$5,600	$101,360	$103,600	$371,840	$368,200
2027	1,130	1,131	1,128	1,128	1,123	1,124	2	-2	-2	-7	-6	-$42,280	$42,000	$44,800	$186,760	$165,760
2028	1,127	1,128	1,127	1,126	1,122	1,122	1	0	-1	-5	-5	-$19,600	$7,000	$25,200	$151,200	$139,160
2029	1,128	1,130	1,128	1,126	1,121	1,123	2	0	-2	-7	-5	-$59,920	$2,520	$60,200	$205,240	$143,080
2030	1,126	1,126	1,123	1,123	1,120	1,122	0	-3	-3	-3	-4	-$10,640	$78,960	$85,960	$95,480	$99,960
2031	1,124	1,126	1,123	1,123	1,121	1,120	1	-1	-1	-4	-4	-$40,600	$35,000	$35,000	$101,920	$115,080
2032	1,122	1,128	1,122	1,122	1,120	1,119	6	0	0	-2	-2	-$174,160	$1,680	$4,200	$58,240	$65,800
2033	1,123	1,123	1,121	1,121	1,119	1,119	0	-2	-2	-4	-4	-$10,360	$52,080	$52,080	$120,680	$123,200
2034	1,122	1,122	1,120	1,118	1,118	1,118	0	-2	-4	-4	-4	-$3,920	$56,560	$111,160	$117,600	$120,960
2035	1,122	1,121	1,121	1,121	1,120	1,120	-1	-1	-1	-2	-2	$29,680	$16,800	$24,080	$43,120	$46,200
2036	1,121	1,123	1,121	1,121	1,120	1,121	2	0	0	-1	0	-$53,200	$0	$0	$35,000	$0
2037	1,119	1,120	1,119	1,119	1,116	1,118	1	0	0	-3	-1	-$24,080	$11,760	$8,120	$79,520	$24,920
2038	1,120	1,120	1,120	1,120	1,116	1,116	0	0	0	-4	-4	$0	$2,800	$2,800	$106,680	$110,040
2039	1,120	1,119	1,120	1,120	1,120	1,120	0	0	0	1	0	$10,920	-$4,760	$0	-$15,120	$0
2040	1,118	1,118	1,118	1,118	1,118	1,118	0	0	0	0	0	$0	$0	$0	-$3,640	$0
2041	1,115	1,119	1,115	1,115	1,116	1,115	4	0	0	1	0	-$104,440	$0	$0	-$19,320	$0
2042	1,117	1,117	1,117	1,117	1,118	1,117	0	0	0	1	0	$10,360	$0	$0	-$14,280	$0
2043	1,113	1,116	1,113	1,113	1,114	1,113	3	0	0	1	0	-$81,760	$0	$0	-$17,080	$0
2044	1,113	1,113	1,113	1,113	1,113	1,113	0	0	0	0	0	$0	$0	$0	-$4,480	$0
2045	1,109	1,109	1,109	1,109	1,109	1,109	0	0	0	0	0	$840	$0	$0	-$4,480	$0
2046	1,109	1,112	1,109	1,109	1,110	1,109	3	0	0	1	0	-$80,360	$0	$0	-$16,800	$0
2047	1,111	1,113	1,111	1,111	1,111	1,111	2	0	0	1	0	-$55,720	$0	$0	-$21,000	$0
2048	1,113	1,113	1,113	1,113	1,113	1,113	0	0	0	0	0	$560	$0	$0	-$4,480	$0
2049	1,113	1,112	1,113	1,113	1,113	1,113	0	0	0	0	0	$1,960	$0	$0	-$4,200	$0
2050	1,110	1,110	1,110	1,110	1,111	1,110	0	0	0	0	0	$560	$0	$0	-$4,480	$0
AVERAGE:																
2002-2016	1,179	1,180	1,171	1,171	1,160	1,160	1	-8	-8	-19	-19	-$32,685	$214,779	$229,395	$544,843	$532,635
2017-2050	1,126	1,127	1,123	1,123	1,119	1,120	1	-3	-3	-7	-6	-$21,025	$88,027	$94,352	$205,652	$170,314
2002-2050	1,142	1,143	1,138	1,137	1,131	1,132	1	-5	-5	-11	-10	-$24,594	$126,829	$135,691	$309,486	$281,229

Table 3

Glen Canyon Dam
Discharge Multipliers and Powerplant Capacity vs. Elevation

Elevation	Multiplier	Capacity (MW)
3701	23.80692	1,050
3700	23.84850	1,048
3699	23.89344	1,046
3698	23.93840	1,044
3697	23.98306	1,042
3696	24.02769	1,040
3695	24.07231	1,039
3694	24.11692	1,037
3693	24.16154	1,035
3692	24.20538	1,033
3691	24.25000	1,031
3690	24.29384	1,029
3689	24.33846	1,027
3688	24.38231	1,025
3687	24.42615	1,023
3686	24.47000	1,022
3685	24.51384	1,020
3684	24.55769	1,018
3683	24.60076	1,016
3682	24.64461	1,014
3681	24.68846	1,013
3680	24.73153	1,011
3679	24.78000	1,009
3678	24.82846	1,007
3677	24.87692	1,005
3676	24.92461	1,003
3675	24.97307	1,001
3674	25.02076	999
3673	25.06846	997
3672	25.11615	995
3671	25.16385	993
3670	25.21154	992
3669	25.25923	990
3668	25.30692	988
3667	25.35385	986
3666	25.40154	984
3665	25.44846	982
3664	25.49539	981
3663	25.54231	979
3662	25.58923	977
3661	25.63615	975
3660	25.68308	973
3659	25.73539	971
3658	25.78770	969
3657	25.83923	968
3656	25.89154	966
3655	25.94385	964
3654	25.99539	962
3653	26.04692	960
3652	26.09846	958
3651	26.15000	956

Elevation	Multiplier	Capacity (MW)
3650	26.20153	954
3649	26.25307	952
3648	26.30384	950
3647	26.35538	949
3646	26.40615	947
3645	26.45692	945
3644	26.50769	943
3643	26.55846	941
3642	26.60923	940
3641	26.66000	938
3640	26.71000	936
3639	26.76692	934
3638	26.82384	932
3637	26.88000	930
3636	26.93692	928
3635	26.99307	926
3634	27.04923	924
3633	27.10538	922
3632	27.16076	920
3631	27.21692	919
3630	27.27307	917
3629	27.32846	915
3628	27.38384	913
3627	27.43923	911
3626	27.49461	909
3625	27.55000	907
3624	27.60461	906
3623	27.66000	904
3622	27.71461	902
3621	27.76923	900
3620	27.82384	899
3619	27.88538	897
3618	27.94692	895
3617	28.00846	893
3616	28.07000	891
3615	28.13076	889
3614	28.19230	887
3613	28.25307	885
3612	28.31384	883
3611	28.37461	881
3610	28.43538	879
3609	28.49538	877
3608	28.55538	875
3607	28.61615	874
3606	28.67615	872
3605	28.73538	870
3604	28.79538	868
3603	28.85538	866
3602	28.91461	865
3601	28.97384	863
3600	29.03307	861

Table 4

Hoover Dam
Powerplant Capacity vs. Elevation

Elevation	Capacity (MW)
1109	1,863
1110	1,865
1111	1,867
1112	1,868
1113	1,870
1114	1,872
1115	1,873
1116	1,875
1117	1,877
1118	1,878
1119	1,880
1120	1,882
1121	1,884
1122	1,885
1123	1,887
1124	1,889
1125	1,890
1126	1,892
1127	1,894
1128	1,895
1129	1,897
1130	1,899
1131	1,900
1132	1,902
1133	1,904
1134	1,905
1135	1,907
1136	1,909
1137	1,918
1138	1,935
1139	1,936
1140	1,938
1141	1,940
1142	1,942
1143	1,943
1144	1,945
1145	1,963
1146	1,971
1147	1,974
1148	2,003
1149	2,005
1150	2,007
1151	2,008
1152	2,010
1153	2,012
1154	2,014
1155	2,015
1156	2,017
1157	2,019
1158	2,024
1159	2,026
1160	2,027
1161	2,029
1162	2,031
1163	2,033
1164	2,034
1165	2,036
1166	2,038
1167	2,040
1168	2,043
1169	2,044
1170	2,046
1171	2,048
1172	2,050
1173	2,051

Elevation	Capacity (MW)
1174	2,053
1175	2,055
1176	2,057
1177	2,058
1178	2,058
1179	2,059
1180	2,060
1181	2,060
1182	2,061
1183	2,061
1184	2,061
1185	2,061
1186	2,061
1187	2,061
1188	2,062
1189	2,062
1190	2,062
1191	2,062
1192	2,062
1193	2,062
1194	2,062
1195	2,062
1196	2,062
1197	2,062
1198	2,062
1199	2,062
1200	2,062
1201	2,062
1202	2,062
1203	2,062
1204	2,062
1205	2,062
1206	2,062
1207	2,062
1208	2,074
1209	2,074
1210	2,074
1211	2,074
1212	2,074
1213	2,074
1214	2,074
1215	2,074
1216	2,074
1217	2,074
1218	2,074
1219	2,074
1220	2,074
1221	2,074
1222	2,074
1223	2,074
1224	2,074
1225	2,074
1226	2,074
1227	2,074
1228	2,074
1229	2,074
1230	2,074
1231	2,074
1232	2,074
1233	2,074
1234	2,074
1235	2,074
1236	2,074
1237	2,074

Table 5

Glen Canyon Powerplant
Summary of Average Annual Capacity and Energy Production

YEAR	Baseline Conditions		Flood Control Alternative		Six States Alternative		Basin States Alternative		California Alternative		Shortage Protection Alternative	
	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)
2002	1,020	4,763	1,020	4,763	1,014	4,799	1,014	4,802	1,007	4,857	1,009	4,841
2003	1,020	4,778	1,020	4,777	1,014	4,813	1,014	4,814	1,007	4,864	1,009	4,851
2004	1,018	4,697	1,018	4,698	1,014	4,733	1,013	4,736	1,001	4,780	1,005	4,777
2005	1,016	4,651	1,016	4,650	1,007	4,675	1,005	4,679	993	4,720	995	4,721
2006	1,011	4,607	1,011	4,606	999	4,638	1,001	4,638	986	4,661	988	4,674
2007	1,009	4,603	1,009	4,603	995	4,606	995	4,607	979	4,599	981	4,615
2008	1,007	4,553	1,007	4,549	995	4,551	995	4,553	979	4,555	979	4,563
2009	1,003	4,532	1,003	4,530	990	4,515	990	4,514	973	4,481	973	4,482
2010	999	4,468	999	4,471	986	4,438	984	4,436	966	4,401	964	4,409
2011	992	4,448	992	4,452	979	4,417	977	4,416	960	4,380	958	4,392
2012	988	4,408	988	4,407	975	4,399	975	4,399	956	4,342	954	4,354
2013	975	4,419	975	4,424	960	4,389	958	4,391	954	4,317	952	4,320
2014	969	4,377	969	4,378	956	4,336	958	4,329	954	4,280	954	4,275
2015	964	4,351	964	4,347	958	4,305	958	4,301	956	4,256	954	4,250
2016	960	4,324	962	4,328	960	4,285	960	4,285	958	4,245	958	4,240
2017	964	4,309	964	4,309	962	4,263	962	4,257	958	4,213	958	4,213
2018	964	4,305	964	4,303	962	4,257	962	4,250	960	4,209	960	4,203
2019	966	4,268	966	4,269	964	4,234	964	4,232	964	4,187	964	4,186
2020	969	4,254	969	4,255	968	4,224	968	4,222	968	4,186	968	4,181
2021	969	4,226	969	4,227	969	4,195	969	4,192	969	4,159	969	4,162
2022	973	4,213	973	4,214	971	4,195	971	4,193	969	4,172	969	4,169
2023	973	4,207	973	4,206	971	4,190	971	4,188	971	4,164	971	4,166
2024	971	4,193	971	4,192	971	4,180	971	4,178	968	4,159	968	4,160
2025	975	4,186	975	4,190	975	4,167	975	4,167	973	4,146	973	4,147
2026	977	4,182	977	4,185	975	4,173	973	4,170	969	4,152	969	4,151
2027	977	4,159	977	4,154	969	4,147	969	4,146	969	4,126	969	4,124
2028	971	4,154	971	4,162	971	4,143	971	4,141	971	4,115	971	4,121
2029	973	4,156	973	4,163	973	4,146	973	4,144	973	4,117	973	4,120
2030	975	4,135	975	4,133	975	4,124	975	4,122	975	4,095	975	4,095
2031	975	4,113	975	4,112	975	4,102	975	4,098	975	4,073	975	4,072
2032	979	4,113	979	4,120	979	4,088	979	4,086	979	4,077	979	4,075
2033	981	4,096	981	4,096	981	4,088	981	4,087	981	4,064	981	4,071
2034	981	4,091	981	4,089	981	4,077	981	4,075	981	4,050	981	4,051
2035	982	4,065	982	4,064	982	4,051	982	4,049	982	4,022	982	4,021
2036	984	4,050	984	4,055	984	4,033	984	4,032	984	4,016	984	4,015
2037	984	4,026	984	4,030	984	4,014	984	4,013	984	4,005	984	4,003
2038	988	4,005	988	4,008	988	3,998	988	3,996	988	3,990	988	3,988
2039	988	4,005	988	4,006	988	3,996	988	3,995	988	3,987	988	3,986
2040	986	3,999	986	3,999	986	3,993	986	3,992	986	3,987	986	3,984
2041	990	3,995	990	3,998	988	3,990	988	3,989	986	3,981	986	3,980
2042	986	3,975	986	3,976	986	3,970	986	3,969	984	3,962	984	3,961
2043	988	3,968	986	3,969	988	3,962	988	3,961	988	3,948	988	3,952
2044	984	3,959	984	3,961	984	3,954	984	3,954	984	3,939	984	3,937
2045	981	3,957	981	3,958	979	3,947	979	3,947	979	3,934	979	3,934
2046	982	3,933	984	3,933	982	3,925	982	3,924	982	3,913	982	3,911
2047	977	3,928	977	3,928	977	3,918	977	3,917	977	3,909	977	3,911
2048	977	3,912	977	3,913	977	3,906	977	3,905	977	3,897	977	3,898
2049	973	3,904	973	3,904	973	3,898	973	3,897	973	3,891	973	3,892
2050	975	3,875	975	3,875	975	3,870	975	3,870	975	3,865	975	3,865
AVERAGE:												
2002-2016	997	4,532	997	4,532	987	4,527	987	4,527	975	4,516	976	4,518
2017-2050	978	4,086	978	4,087	977	4,071	977	4,069	976	4,050	976	4,050
2002-2050	983	4,222	984	4,223	980	4,211	980	4,209	976	4,193	976	4,193

Table 6

Glen Canyon Powerplant
Comparison of Capacity and Energy Production to Baseline Conditions
(Average Annual Value)

YEAR	Flood Control Alternative		Six States Alternative		Basin States Alternative		California Alternative		Shortage Protection Alternative	
	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)
2002	0	0	-5	37	-5	39	-13	94	-11	79
2003	0	-2	-5	34	-5	36	-13	86	-11	73
2004	0	0	-4	35	-5	39	-17	82	-13	80
2005	0	-2	-9	24	-11	27	-23	68	-21	70
2006	0	0	-12	31	-10	32	-25	54	-23	68
2007	0	0	-14	3	-14	5	-30	-4	-28	12
2008	0	-4	-12	-2	-12	0	-28	2	-28	10
2009	0	-2	-13	-17	-13	-18	-30	-51	-30	-51
2010	0	3	-13	-31	-15	-33	-34	-67	-36	-59
2011	0	4	-13	-31	-15	-32	-32	-68	-34	-56
2012	0	-1	-13	-8	-13	-9	-32	-66	-34	-54
2013	0	5	-15	-30	-17	-28	-21	-102	-23	-99
2014	0	1	-13	-41	-12	-48	-15	-97	-15	-102
2015	0	-4	-6	-46	-6	-50	-8	-95	-9	-101
2016	2	5	0	-38	0	-39	-2	-78	-2	-83
2017	0	0	-2	-46	-2	-51	-6	-96	-6	-96
2018	0	-2	-2	-48	-2	-55	-4	-96	-4	-101
2019	0	1	-2	-35	-2	-36	-2	-81	-2	-82
2020	0	1	-2	-30	-2	-32	-2	-67	-2	-73
2021	0	2	0	-31	0	-34	0	-67	0	-64
2022	0	1	-2	-18	-2	-19	-4	-41	-4	-44
2023	0	-1	-2	-17	-2	-19	-2	-43	-2	-40
2024	0	-1	0	-13	0	-15	-4	-35	-4	-34
2025	0	4	0	-19	0	-19	-2	-39	-2	-39
2026	0	2	-4	-11	-4	-13	-8	-30	-8	-31
2027	0	-5	-8	-12	-8	-13	-8	-33	-8	-35
2028	0	7	0	-11	0	-13	0	-39	0	-33
2029	0	0	0	-11	0	-12	0	-39	0	-37
2030	0	-1	0	-11	0	-12	0	-40	0	-40
2031	0	1	0	-11	0	-15	0	-40	0	-41
2032	0	6	0	-25	0	-27	0	-37	0	-38
2033	0	1	0	-7	0	-9	0	-31	0	-25
2034	0	-2	0	-14	0	-16	0	-40	0	-40
2035	0	-1	0	-14	0	-15	0	-43	0	-44
2036	0	5	0	-17	0	-18	0	-34	0	-36
2037	0	4	0	-12	0	-13	0	-21	0	-23
2038	0	3	0	-7	0	-9	0	-15	0	-17
2039	0	1	0	-8	0	-10	0	-18	0	-18
2040	0	0	0	-6	0	-7	0	-12	0	-15
2041	0	4	-2	-5	-2	-6	-4	-13	-4	-15
2042	0	2	0	-4	0	-5	-2	-12	-2	-14
2043	-2	1	0	-6	0	-7	0	-20	0	-16
2044	0	2	0	-5	0	-6	0	-20	0	-23
2045	0	2	-2	-9	-2	-10	-2	-23	-2	-23
2046	2	0	0	-8	0	-9	0	-21	0	-22
2047	0	0	0	-9	0	-11	0	-18	0	-17
2048	0	1	0	-6	0	-7	0	-16	0	-15
2049	0	0	0	-5	0	-6	0	-13	0	-12
2050	0	0	0	-5	0	-5	0	-10	0	-10
AVERAGE:										
2002-2016	0	0	-10	-5	-10	-5	-21	-16	-21	-14
2017-2050	0	1	-1	-15	-1	-16	-1	-35	-1	-36
2002-2050	0	1	-4	-12	-4	-13	-8	-30	-7	-29

Table 7

Hoover Powerplant
Summary of Average Annual Capacity and Energy Production

YEAR	Baseline Conditions		Flood Control Alternative		Six States Alternative		Basin States Alternative		California Alternative		Shortage Protection Alternative	
	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)
2002	2,062	4,451	2,062	4,451	2,061	4,664	2,061	4,680	2,061	4,956	2,061	4,881
2003	2,062	4,870	2,062	4,863	2,061	4,993	2,061	4,994	2,061	5,175	2,061	5,127
2004	2,062	4,893	2,062	4,859	2,061	4,959	2,061	4,968	2,058	5,032	2,060	5,057
2005	2,062	4,853	2,062	4,836	2,061	4,918	2,061	4,911	2,057	4,987	2,058	5,004
2006	2,061	4,852	2,061	4,873	2,059	4,890	2,060	4,901	2,044	4,923	2,046	4,931
2007	2,061	4,862	2,061	4,874	2,057	4,859	2,057	4,864	2,040	4,850	2,043	4,907
2008	2,061	4,781	2,061	4,777	2,057	4,801	2,055	4,807	2,038	4,816	2,034	4,808
2009	2,059	4,714	2,059	4,708	2,051	4,721	2,050	4,714	2,029	4,711	2,033	4,711
2010	2,060	4,652	2,060	4,657	2,048	4,622	2,048	4,629	2,026	4,623	2,014	4,614
2011	2,055	4,621	2,055	4,626	2,043	4,586	2,040	4,585	2,010	4,543	2,008	4,558
2012	2,053	4,592	2,055	4,611	2,034	4,561	2,033	4,571	2,008	4,483	2,005	4,479
2013	2,044	4,580	2,050	4,577	2,024	4,529	2,024	4,529	1,963	4,452	1,943	4,427
2014	2,038	4,553	2,050	4,553	2,019	4,485	2,017	4,482	1,907	4,407	1,942	4,393
2015	2,046	4,519	2,046	4,523	2,019	4,472	2,015	4,464	1,909	4,366	1,936	4,359
2016	2,033	4,487	2,033	4,497	2,005	4,412	1,971	4,408	1,907	4,315	1,904	4,317
2017	2,027	4,479	2,027	4,474	1,971	4,352	1,945	4,330	1,900	4,151	1,899	4,183
2018	2,017	4,449	2,019	4,448	1,936	4,309	1,918	4,308	1,897	4,162	1,909	4,180
2019	2,010	4,374	2,010	4,376	1,940	4,275	1,935	4,262	1,894	4,158	1,900	4,185
2020	2,010	4,389	2,010	4,389	1,935	4,284	1,942	4,280	1,894	4,182	1,900	4,207
2021	1,945	4,337	1,945	4,339	1,907	4,226	1,907	4,216	1,887	4,104	1,894	4,121
2022	1,940	4,294	1,940	4,299	1,900	4,195	1,902	4,198	1,885	4,038	1,890	4,077
2023	1,909	4,230	1,909	4,241	1,897	4,182	1,895	4,179	1,878	4,007	1,892	4,067
2024	1,907	4,189	1,907	4,203	1,900	4,110	1,900	4,092	1,880	3,933	1,895	4,010
2025	1,905	4,151	1,904	4,130	1,895	4,026	1,895	4,017	1,880	3,878	1,887	3,911
2026	1,900	4,108	1,902	4,124	1,895	3,975	1,895	3,962	1,878	3,825	1,878	3,846
2027	1,899	4,041	1,900	4,050	1,895	3,941	1,895	3,939	1,887	3,769	1,889	3,834
2028	1,894	3,959	1,895	3,986	1,887	3,870	1,892	3,862	1,885	3,700	1,885	3,771
2029	1,895	3,958	1,895	3,954	1,895	3,838	1,892	3,836	1,884	3,692	1,887	3,737
2030	1,892	3,961	1,892	3,956	1,887	3,805	1,887	3,784	1,885	3,674	1,885	3,710
2031	1,889	3,929	1,892	3,940	1,887	3,783	1,887	3,760	1,884	3,659	1,882	3,714
2032	1,885	3,887	1,892	3,888	1,885	3,767	1,885	3,759	1,882	3,642	1,880	3,683
2033	1,887	3,856	1,887	3,844	1,884	3,741	1,884	3,732	1,880	3,624	1,880	3,659
2034	1,885	3,855	1,885	3,875	1,882	3,742	1,878	3,738	1,878	3,634	1,878	3,684
2035	1,885	3,840	1,884	3,837	1,884	3,723	1,884	3,718	1,882	3,619	1,882	3,670
2036	1,884	3,803	1,887	3,807	1,884	3,711	1,884	3,708	1,882	3,606	1,884	3,666
2037	1,880	3,757	1,882	3,778	1,880	3,726	1,880	3,704	1,875	3,598	1,878	3,652
2038	1,882	3,727	1,882	3,740	1,882	3,677	1,882	3,655	1,875	3,544	1,875	3,595
2039	1,882	3,730	1,880	3,726	1,882	3,645	1,882	3,643	1,882	3,564	1,882	3,619
2040	1,878	3,665	1,878	3,661	1,878	3,593	1,878	3,593	1,878	3,518	1,878	3,586
2041	1,873	3,650	1,880	3,649	1,873	3,626	1,873	3,625	1,875	3,563	1,873	3,625
2042	1,877	3,584	1,877	3,591	1,877	3,569	1,877	3,568	1,878	3,511	1,877	3,564
2043	1,870	3,617	1,875	3,623	1,870	3,592	1,870	3,592	1,872	3,535	1,870	3,585
2044	1,870	3,606	1,870	3,623	1,870	3,580	1,870	3,597	1,870	3,509	1,870	3,572
2045	1,863	3,547	1,863	3,544	1,863	3,552	1,863	3,544	1,863	3,478	1,863	3,524
2046	1,863	3,566	1,868	3,593	1,863	3,557	1,863	3,543	1,865	3,490	1,863	3,540
2047	1,867	3,565	1,870	3,577	1,867	3,548	1,867	3,551	1,867	3,479	1,867	3,522
2048	1,870	3,532	1,870	3,525	1,870	3,526	1,870	3,517	1,870	3,434	1,870	3,488
2049	1,870	3,534	1,868	3,552	1,870	3,503	1,870	3,496	1,870	3,426	1,870	3,475
2050	1,865	3,532	1,865	3,511	1,865	3,499	1,865	3,496	1,867	3,413	1,865	3,453
AVERAGE:												
2002-2016	2,055	4,685	2,056	4,686	2,044	4,698	2,041	4,701	2,008	4,709	2,010	4,705
2017-2050	1,902	3,903	1,903	3,908	1,890	3,823	1,889	3,816	1,880	3,709	1,882	3,756
2002-2050	1,949	4,142	1,950	4,146	1,937	4,091	1,935	4,087	1,919	4,016	1,921	4,047

Table 8

Hoover Powerplant
Comparison of Capacity and Energy Production to Baseline Conditions
(Average Annual Value)

YEAR	Flood Control Alternative		Six States Alternative		Basin States Alternative		California Alternative		Shortage Protection Alternative	
	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)	CAPACITY (MW)	ENERGY (GWh)
2002	0	0	-1	213	-1	228	-1	505	-1	429
2003	0	-7	-1	123	-1	124	-1	305	-1	256
2004	0	-34	-1	67	-1	75	-4	139	-2	165
2005	0	-17	-1	65	-1	58	-5	134	-4	151
2006	0	20	-2	38	-1	49	-17	71	-15	79
2007	0	12	-4	-3	-4	2	-21	-12	-18	45
2008	0	-4	-4	19	-6	26	-23	35	-27	27
2009	0	-6	-8	7	-9	0	-30	-3	-26	-3
2010	0	5	-12	-30	-12	-23	-34	-29	-46	-37
2011	0	5	-12	-35	-15	-35	-45	-77	-47	-63
2012	2	20	-19	-31	-20	-21	-45	-109	-48	-112
2013	5	-3	-20	-51	-20	-51	-81	-128	-101	-153
2014	12	-1	-19	-69	-21	-72	-131	-146	-96	-161
2015	0	3	-27	-47	-31	-55	-137	-154	-110	-160
2016	0	10	-28	-75	-62	-79	-126	-172	-129	-170
2017	0	-5	-56	-127	-83	-149	-127	-218	-129	-297
2018	2	-1	-81	-141	-100	-141	-120	-287	-108	-269
2019	0	2	-70	-99	-75	-112	-116	-215	-110	-189
2020	0	0	-75	-105	-69	-109	-116	-206	-110	-181
2021	0	2	-38	-111	-38	-120	-58	-233	-51	-216
2022	0	6	-39	-98	-38	-96	-58	-256	-50	-216
2023	0	10	-12	-109	-13	-112	-30	-224	-17	-163
2024	0	14	-7	-78	-7	-87	-27	-255	-12	-178
2025	-2	-21	-10	-125	-10	-134	-25	-272	-18	-240
2026	2	16	-5	-133	-5	-145	-22	-283	-22	-262
2027	2	19	-3	-100	-3	-102	-12	-272	-10	-206
2028	2	27	0	-89	-2	-97	-8	-259	-8	-188
2029	3	-1	-6	-120	-3	-122	-12	-266	-8	-221
2030	0	-4	-5	-156	-5	-176	-7	-287	-7	-250
2031	3	11	-2	-146	-2	-169	-5	-269	-7	-215
2032	10	1	0	-120	0	-128	-3	-245	-5	-204
2033	0	-12	-3	-115	-3	-124	-7	-232	-7	-197
2034	0	20	-3	-113	-7	-117	-7	-221	-7	-172
2035	-2	-2	-2	-117	-2	-122	-3	-221	-3	-170
2036	3	5	0	-92	0	-95	-2	-196	0	-137
2037	2	21	0	-31	0	-53	-5	-159	-2	-105
2038	0	14	0	-50	0	-72	-7	-182	-7	-131
2039	-2	-4	0	-84	0	-87	0	-165	0	-110
2040	0	-5	0	-72	0	-72	0	-148	0	-79
2041	7	-2	0	-24	0	-25	2	-87	0	-25
2042	0	7	0	-16	0	-17	2	-73	0	-21
2043	5	5	0	-25	0	-25	2	-82	0	-32
2044	0	17	0	-26	0	-9	0	-96	0	-34
2045	0	-3	0	5	0	-2	0	-69	0	-23
2046	5	27	0	-8	0	-23	2	-76	0	-25
2047	3	12	0	-16	0	-14	0	-85	0	-43
2048	0	-7	0	-6	0	-15	0	-98	0	-44
2049	-2	18	0	-31	0	-38	0	-108	0	-59
2050	0	-21	0	-33	0	-36	2	-118	0	-79
AVERAGE:										
2002-2016	1	0	-11	13	-14	15	-47	24	-45	20
2017-2050	1	5	-12	-80	-14	-87	-23	-193	-20	-147
2002-2050	1	3	-12	-51	-14	-56	-30	-127	-28	-96

ATTACHMENT Q

Ten Tribes Depletion Schedule

This attachment contains a summary of Tribal water demands of the Ten Tribes Partnership used in FEIS modeling in the Colorado River Simulation System (CRSS). This listing has been updated from that presented in the DEIS.

Attachment Q
Ten Tribes Depletion Schedules

This attachment was derived from information sent to Reclamation from the Ten Tribes Partnership, as well as conversations held directly with representatives of the Jicarilla Tribe. As discussed in the DEIS, the CRSS model was altered to directly represent the scheduled diversions for the Ten Tribes.

Upper Basin Tribal Water Rights and Diversions

Table Q-1 lists the water rights and diversion locations of the Ten Tribes members in the Upper Basin, whose diversions are part of the Upper Division states apportionments. For each tribe, the table lists the diversion points which are represented in the CRSS model, the current annual volumes of diverted water (estimated 2000 volumes), and the full Colorado River water right held by the Tribe. As discussed in Section 3.14, the water rights are usually based on the amounts of agricultural acreage cited. Table Q-2 lists, for each Tribe, the current and projected depletions at each model demand node (representing each diversion point) used in model analysis. The depletions for each diversion point consist of the withdrawal from the river system minus the return flow to the river system, both of which are cited on the table.

Because each Tribal diversion is attributed to one of the Upper Basin states, the state diversion and depletion schedules used in the model include the Tribal diversions and depletions. Interim surplus criteria had no effect on Upper Basin deliveries, as expected, including the Indian demands above Lake Powell. As noted in Section 3.4.4.4, the normal delivery schedules of all Upper Basin diversions would be met under most water supply conditions. An Upper Basin diversion would be shorted only under periods of low hydrologic conditions and inadequate regulating reservoir storage capacity upstream of the diversion points. The model is not presently configured to track the relative priorities under those conditions. However, such effects are identical under baseline conditions and all alternatives.

Lower Basin Tribal Water Rights and Diversions

Table Q-3 lists the water rights and diversion locations of the Ten Tribes members in the Lower Basin, whose diversions are part of the Lower Division states normal apportionments. For each tribe, the table lists the diversion points which are represented in the CRSS model, the current annual volumes of diverted water (estimated 2000 volumes), and the full Colorado River water right held by the Tribe. As discussed in Section 3.14, the water rights are usually based on the amounts of agricultural acreage cited. Table Q-4 lists, for each Tribe, the current and projected depletions at each model demand node (representing each diversion point) used in model analysis. The depletions for each diversion point consist of the withdrawal from the river system minus the return flow to the river system, both of which are cited on the table.

Because each Tribal diversion is attributed to one of the Lower Basin states, the state diversion and depletion schedules used in the model include the Tribal diversions and depletions. Under normal conditions, deliveries to the Lower Basin are always equal to the normal depletion schedules, including those for the Indian tribes. Under shortage conditions, only CAP and SNWA share in the shortage until CAP goes to zero (which was not observed in any of the modeling runs done for this FEIS). Therefore, all tribes in the Ten Tribes Partnership in the Lower Basin receive their scheduled depletion amounts with the exception of the Cocopah Tribe, which has some Arizona Priority 4 water. However, the model is currently configured to assign all Priority 4 shortages to CAP, not other Priority 4 water users, as discussed in Section 3.4.4.4.

Table Q-1
Summary of Ten Tribes Partnership Water Rights and Diversion Locations in the Upper Basin

Tribe	State	River Basin	Point Description	Current		Full Right	
				Withdrawal (kaf)	Irrigated Acres	Allocated (kaf)	Allocated Acres
Northern Ute	Utah	Green	Ute Indian Uses Since 1965	12	3000	12	3000
Northern Ute	Utah	White	Ute Indians Compact (White River)	0	0	63	13192
Northern Ute	Utah	Green	Ute Indians Compact (Green River)	20	4350	124	27280
Northern Ute	Utah	Duchesne	Ag Abv Randlett-Pl-Ag - Ute	218	66074	218	66074
Northern Ute	Utah	Duchesne	New Indian Lands - Ute Indian Compact	0	0	54	8726
			Northern Ute Tribal Totals	250	73424	471	118272
Navajo	Arizona	San Juan	Gallup-Navajo Indian Water Supply-Tem	0	0	5	M&I
Navajo	New Mexico	San Juan	Navajo Indian Irrigation Project	183	63881	338	110630
Navajo	New Mexico	San Juan	Animas-LP New Mexico M&I - Navajo	0	0	5	M&I
Navajo	New Mexico	San Juan	Gallup Mun. Water Supply Proj.-Navajo	0	0	18	M&I
Navajo	New Mexico	San Juan	New Mexico Ag Hogback - Cudei	20	4348	42	9130
Navajo	New Mexico	San Juan	New Mexico Ag Fruitland - Misc	12	2609	32	6957
			Navajo Tribal Totals	215	70838	440	126717
Jicarilla Apache	New Mexico	San Juan	Jicarilla Apache	4	1000	32	9500
Jicarilla Apache	New Mexico	San Juan	San Juan Thermal (PNM) - Jicarilla Lease	16	0	0	M&I
Jicarilla Apache	New Mexico	San Juan	San Juan-Chama Export (Jicarilla Portion)	7		7	Transbasin
Jicarilla Apache	New Mexico	San Juan	Future Off-Reservation M&I Leases	0		8	M&I
			Jicarilla Apache Tribal Totals	27	1000	46	9500
Southern Ute	Colorado	San Juan	P.L.-Ag Colorado - So. Utes	42	13815	49	16328
Southern Ute	Colorado	San Juan	Animas-La Plata M And I - So. Utes	0	0	40	M&I
			Southern Ute Tribal Totals	42	13815	89	16328
Ute Mountain Ute	Colorado	San Juan	Animas-La Plata M And I - Ute Mntn	0	0	40	M&I
Ute Mountain Ute	Colorado	San Juan	Colorado Ag - Ute Mntn	2	500	27	6750
Ute Mountain Ute	Colorado	San Juan	Dolores Import - Ag Use - Ute Mntn	17	5415	23	7500
Ute Mountain Ute	Colorado	San Juan	Dolores Import - M And I - Ute Mntn	2	0	2	M&I
			Ute Mountain Ute Tribal Totals	21	5915	92	14250
			Upper Basin Totals	555	164992	1137	285067
			Ten Tribes Partnership Totals	1310	265941	2063	424715

Table Q-2
Summary of Ten Tribes Partnership Development Schedules in the Upper Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)										
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Northern Ute	Utah	Green	Ute Indian Uses Since 1965	Withdrawal	12	12	12	12	12	12	12	12	12	12
				Depletion	6	6	6	6	6	6	6	6	6	6
				Return Flow	6	6	6	6	6	6	6	6	6	6
Northern Ute	Utah	White	Ute Indians Compact (White River)	Withdrawal	0	8	16	24	32	40	56	63	63	63
				Depletion	0	4	8	12	16	20	28	31	31	31
				Return Flow	0	4	8	12	16	20	28	32	32	32
Northern Ute	Utah	Green	Ute Indians Compact (Green River)	Withdrawal	20	30	42	54	68	84	100	124	124	124
				Depletion	10	15	21	27	34	43	50	63	63	63
				Return Flow	10	15	21	27	34	41	50	61	61	61
Northern Ute	Utah	Duchesne	Ag Abv Randlett-Pl-Ag - Ute	Withdrawal	218	218	218	218	218	218	218	218	218	218
				Depletion	109	109	109	109	109	109	109	109	109	109
				Return Flow	109	109	109	109	109	109	109	109	109	109
Northern Ute	Utah	Duchesne	New Indian Lands - Ute Indian Compact	Withdrawal	0	6	12	18	24	30	36	54	54	54
				Depletion	0	3	9	13	18	22	27	40	40	40
				Return Flow	0	2	3	5	6	8	9	14	14	14
			Northern Ute Tribal Totals	Withdrawal	250	274	300	326	354	384	422	471	471	471
				Depletion	125	138	153	167	183	200	220	249	249	249
				Return Flow	125	136	147	159	171	184	202	222	222	222

Table Q-2
Summary of Ten Tribes Partnership Development Schedules in the Upper Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)									
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Navajo	Arizona	San Juan	Gallup-Navajo Indian Water Supply-Tem	Withdrawal	0	0	5	5	5	5	5	5	5	5
				Depletion	0	0	5	5	5	5	5	5	5	5
				Return Flow	0	0	0	0	0	0	0	0	0	0
Navajo	New Mexico	San Juan	Navajo Indian Irrigation Project	Withdrawal	183	269	313	325	330	333	336	338	338	338
				Depletion	146	215	250	260	264	266	269	270	270	270
				Return Flow	37	54	63	65	66	67	67	68	68	68
Navajo	New Mexico	San Juan	Animas-LP New Mexico M&I - Navajo	Withdrawal	0	4	5	5	5	5	5	5	5	5
				Depletion	0	2	3	3	3	3	3	3	3	3
				Return Flow	0	2	2	2	2	2	2	2	2	2
Navajo	New Mexico	San Juan	Gallup Mun. Water Supply Proj.-Navajo	Withdrawal	0	5	10	14	18	18	18	18	18	18
				Depletion	0	5	10	14	18	18	18	18	18	18
				Return Flow	0	0	0	0	0	0	0	0	0	0
Navajo	New Mexico	San Juan	New Mexico Ag Hogback - Cudei	Withdrawal	20	24	26	28	32	36	42	42	42	42
				Depletion	10	12	13	14	16	18	21	21	21	21
				Return Flow	10	12	13	14	16	18	21	21	21	21
Navajo	New Mexico	San Juan	New Mexico Ag Fruitland - Misc	Withdrawal	12	14	16	18	22	26	32	32	32	32
				Depletion	6	7	8	9	11	13	16	16	16	16
				Return Flow	6	7	8	9	11	13	16	16	16	16
			Navajo Tribal Totals	Withdrawal	215	316	375	395	412	423	438	440	440	440
				Depletion	162	241	289	305	317	323	332	333	333	333
				Return Flow	53	75	86	90	95	100	106	107	107	107

Table Q-2
Summary of Ten Tribes Partnership Development Schedules in the Upper Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)										
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Jicarilla Apache	New Mexico	San Juan	Jicarilla Apache	Withdrawal	4	11	11	11	11	11	11	11	11	11
				Depletion	2	7	7	7	7	7	7	7	7	7
				Return Flow	2	4	4	4	4	4	4	4	4	4
Jicarilla Apache	New Mexico	San Juan	*San Juan Thermal-(PNM) - Jicarilla Lease	Withdrawal	0	16	16	16	16	16	16	16	16	16
				Depletion	0	16	16	16	16	16	16	16	16	16
				Return Flow	0	0	0	0	0	0	0	0	0	0
Jicarilla Apache	New Mexico	San Juan	San Juan-Chama Export (Jicarilla Portion)	Withdrawal	7	7	7	7	7	7	7	7	7	7
				Depletion	7	7	7	7	7	7	7	7	7	7
Jicarilla Apache	New Mexico	San Juan	Future Off-Reservation M&I Leases	Withdrawal	0	3	3	4	4	4	4	4	4	4
				Depletion	0	3	3	4	4	4	4	4	4	4
			Jicarilla Apache Tribal Totals	Withdrawal	11	37	37	38	38	38	38	38	38	38
				Depletion	9	33	33	31	34	34	34	34	34	34
*The PNM lease begins in 2006				Return Flow	2	4	4	4	4	11	11	11	11	11
Southern Ute	Colorado	San Juan	P.L.-Ag Colorado - So. Utes	Withdrawal	42	44	45	46	48	49	49	49	49	49
				Depletion	22	23	23	24	25	26	26	26	26	26
				Return Flow	20	21	22	22	23	23	23	23	23	23
Southern Ute	Colorado	San Juan	Animas-La Plata M&I - So. Utes	Withdrawal	0	4	6	9	12	16	20	26	33	40
				Depletion	0	2	3	5	6	8	10	13	17	20
				Return Flow	0	2	3	4	6	8	10	13	16	20
			Southern Ute Tribal Totals	Withdrawal	42	48	51	55	60	65	69	75	82	89
				Depletion	22	25	26	29	31	34	36	39	43	46
				Return Flow	20	23	25	26	29	31	33	36	39	43

Table Q-2
Summary of Ten Tribes Partnership Development Schedules in the Upper Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)										
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Ute Mountain Ute	Colorado	San Juan	Animas-La Plata M And I - Ute Mntn	Withdrawal	0	4	6	9	12	16	20	26	33	40
				Depletion	0	2	3	5	6	8	10	13	17	20
				Return Flow	0	2	3	4	6	8	10	13	16	20
Ute Mountain Ute	Colorado	San Juan	Colorado Ag - Ute Mntn	Withdrawal	2	4	6	8	10	12	14	18	22	27
				Depletion	1	2	3	4	6	7	8	11	15	19
				Return Flow	1	2	3	4	4	5	6	7	7	8
Ute Mountain Ute	Colorado	San Juan	Dolores Import - Ag Use - Ute Mntn	Withdrawal	17	19	20	21	23	23	23	23	23	23
				Depletion	13	15	16	17	18	18	18	18	18	18
				Return Flow	4	4	4	4	5	5	5	5	5	5
Ute Mountain Ute	Colorado	San Juan	Dolores Import - M And I - Ute Mntn	Withdrawal	2	2	2	2	2	2	2	2	2	2
				Depletion	1	1	1	1	1	1	1	1	1	1
				Return Flow	1	1	1	1	1	1	1	1	1	1
			Ute Mountain Ute Tribal Totals	Withdrawal	21	29	34	40	47	53	59	69	80	92
				Depletion	15	20	23	27	31	34	37	43	51	58
				Return Flow	6	9	11	13	16	19	22	26	29	34
			Upper Basin Totals	Withdrawal	555	704	797	854	910	968	1033	1100	1118	1137
				Depletion	349	457	524	562	595	622	659	698	710	720
				Return Flow	206	247	273	292	315	346	374	402	408	417
			Ten Tribes Partnership Totals	Withdrawal	1310	1509	1663	1780	1836	1894	1959	2026	2044	2063
				Depletion	763	952	1097	1214	1247	1274	1311	1350	1362	1372
				Return Flow	547	557	566	566	589	620	648	676	682	691

Table Q-3
Summary of Ten Tribes Partnership Water Rights and Diversion Locations in the Lower Basin

Tribe	State	River Basin	Point Description	Current		Full Right	
				Withdrawal (kaf)	Irrigated Acres	Allocated (kaf)	Allocated Acres
Fort Mojave	Nevada	Colorado	Fort Mohave Indian Res.(Nevada)	5	716	13	1939
Fort Mojave	Arizona	Colorado	Fort Mohave Indian Res.(Arizona)	81	10925	104	16018
Fort Mojave	California	Colorado	Fort Mohave Indian Res.(Calif.)	27	3354	17	2586
Fort Mojave	California	Colorado	Fort Mohave Land Development	0	0	0	0
			Fort Mojave Tribal Totals	113	14995	134	20543
Chemehuevi	California	Colorado	Chemehuevi Ind Res.	2	100	11	1900
			Chemehuevi Tribal Totals	2	100	11	1900
Colorado River	California	Colorado	CRIR Calif	5	3165	55	8213
Colorado River	Arizona	Colorado	CRIR Arizona	591	76633	662	99375
Colorado River	Arizona	Colorado	CRIR Pumped	0	0	0	0
			Colorado River Tribal Totals	596	79798	717	107588
Quechan	California	Colorado	Yuma Proj. Reservation Unit	31	3656.4	52	7743
			Quechan Tribal Totals	31	3656.4	52	7743
Cocopah	Arizona	Colorado	Cocopah Indian Reservation	13	2400	12	1874
Cocopah	Arizona	Colorado	Cocopah Indian Reservation	0	0	0	0
			Cocopah Tribal Totals	13	2400	12	1874
			Lower Basin Totals	755	100949	926	139648
			Ten Tribes Partnership Totals	1310	265941	2063	424715

Table Q-4
Summary of Ten Tribes Partnership Development Schedules in the Lower Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)									
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Fort Mojave	Nevada	Colorado	Fort Mohave Indian Res.(Nevada)	Withdrawal	5	13	13	13	13	13	13	13	13	13
				Depletion	2	8	9	9	9	9	9	9	9	9
				Return Flow	3	5	4	4	4	4	4	4	4	4
Fort Mojave	Arizona	Colorado	Fort Mohave Indian Res.(Arizona)	Withdrawal	81	92	104	104	104	104	104	104	104	104
				Depletion	36	60	73	73	73	73	73	73	73	73
				Return Flow	45	32	31	31	31	31	31	31	31	31
Fort Mojave	California	Colorado	Fort Mohave Indian Res.(Calif.)	Withdrawal	27	17	17	17	17	17	17	17	17	17
				Depletion	15	12	12	12	12	12	12	12	12	12
				Return Flow	12	5	5	5	5	5	5	5	5	5
Fort Mojave	California	Colorado	Fort Mohave Land Development	Withdrawal	0	0	0	0	0	0	0	0	0	0
				Depletion	0	0	0	0	0	0	0	0	0	0
				Return Flow	0	0	0	0	0	0	0	0	0	0
			Fort Mojave Tribal Totals	Withdrawal	113	122	134	134	134	134	134	134	134	134
				Depletion	53	80	94	94	94	94	94	94	94	94
				Return Flow	60	42	40	40	40	40	40	40	40	40
Chemehuevi	California	Colorado	Chemehuevi Ind Res.	Withdrawal	2	5	8	11	11	11	11	11	11	11
				Depletion	1	3	5	8	8	8	8	8	8	8
				Return Flow	1	2	3	3	3	3	3	3	3	3
			Chemehuevi Tribal Totals	Withdrawal	2	5	8	11	11	11	11	11	11	11
				Depletion	1	3	5	8	8	8	8	8	8	8
				Return Flow	1	2	3	3	3	3	3	3	3	3
Colorado River	California	Colorado	CRIR Calif	Withdrawal	5	15	30	55	55	55	55	55	55	55
				Depletion	3	9	19	39	39	39	39	39	39	39
				Return Flow	2	6	11	16	16	16	16	16	16	16
Colorado River	Arizona	Colorado	CRIR Arizona	Withdrawal	591	612	637	662	662	662	662	662	662	662
				Depletion	327	367	414	463	463	463	463	463	463	463
				Return Flow	264	245	223	199	199	199	199	199	199	199
Colorado River	Arizona	Colorado	CRIR Pumped	Withdrawal	0	0	0	0	0	0	0	0	0	0
				Depletion	0	0	0	0	0	0	0	0	0	0
				Return Flow	0	0	0	0	0	0	0	0	0	0
			Colorado River Tribal Totals	Withdrawal	596	627	667	717	717	717	717	717	717	717
				Depletion	330	376	433	502	502	502	502	502	502	502
				Return Flow	266	251	234	215	215	215	215	215	215	215

Table Q-4
Summary of Ten Tribes Partnership Development Schedules in the Lower Basin

Tribe	State	River Basin	Point Description	Development Schedule by Year (kaf)									
				Water Type	2000	2005	2010	2015	2020	2025	2030	2040	2050	2060
Quechan	California	Colorado	Yuma Proj. Reservation Unit	Withdrawal	31	38	45	52	52	52	52	52	52	52
				Depletion	17	23	29	36	36	36	36	36	36	36
				Return Flow	14	15	16	16	16	16	16	16	16	16
			Quechan Tribal Totals	Withdrawal	31	38	45	52	52	52	52	52	52	52
				Depletion	17	23	29	36	36	36	36	36	36	36
				Return Flow	14	15	16	16	16	16	16	16	16	16
Cocopah	Arizona	Colorado	Cocopah Indian Reservation	Withdrawal	13	13	12	12	12	12	12	12	12	12
				Depletion	13	13	12	12	12	12	12	12	12	12
				Return Flow	0	0	0	0	0	0	0	0	0	0
Cocopah	Arizona	Colorado	Cocopah Indian Reservation	Withdrawal	0	0	0	0	0	0	0	0	0	0
				Depletion	0	0	0	0	0	0	0	0	0	0
				Return Flow	0	0	0	0	0	0	0	0	0	0
			Cocopah Tribal Totals	Withdrawal	13	13	12	12	12	12	12	12	12	12
				Depletion	13	13	12	12	12	12	12	12	12	12
				Return Flow	0	0	0	0	0	0	0	0	0	0
			Lower Basin Totals	Withdrawal	755	805	866	926	926	926	926	926	926	926
				Depletion	414	495	573	652	652	652	652	652	652	652
				Return Flow	341	310	293	274	274	274	274	274	274	274
			Ten Tribes Partnership Totals	Withdrawal	1310	1509	1663	1780	1836	1894	1959	2026	2044	2063
				Depletion	763	952	1097	1214	1247	1274	1311	1350	1362	1372
				Return Flow	547	557	566	566	589	620	648	676	682	691

ATTACHMENT R

Public Scoping Process

This attachment summarizes the scoping process conducted by Reclamation in 1999 to inform the public of the proposal to formulate interim surplus criteria and to obtain public input to the alternative formulation process.

PUBLIC SCOPING PROCESS

INTRODUCTION

This attachment summarizes public and governmental agency responses received during the initial scoping process. It consists of verbal responses at public scoping meetings held by Reclamation and written responses that are included in the summary table. This section also describes the various agencies involved in the production of this document, and associated permitting or formal consultation that may be necessary.

"Scoping" is an integral part of the NEPA process. It provides "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR § 1501.7).

In the June 9, 1999 letter, addressed to "all interested persons", Reclamation inviting public participation in the scoping meeting, Reclamation invited oral or written comments concerning the following:

> "(1) the need for the development of surplus criteria, (2) the format for the criteria [either by revising Article III(3) of the Long-Range Operating Criteria or by developing interim criteria pursuant to Article III(3) of the Long-Range Operating Criteria], and (3) the specific issues and alternatives to be analyzed in the National Environment Policy Act process."

SCOPING ACTIVITIES AND ISSUES

SCOPING ANNOUNCEMENTS

Two notices were published in the *Federal Register* regarding the development of surplus criteria for management of the Colorado River. The first notice (64 FR 27008), published on May 18, 1999, was Reclamation's Notice to solicit comments and initiation of NEPA Process. The second notice (64 FR 29068), published on May 28, 1999, was Reclamation's Notice of public meetings.

Reclamation issued a press release on May 19, 1999 to ten newspapers, announcing the publication in the *Federal Register* of the Notice of Intent.

The public scoping meetings were announced by press release and by a memorandum sent to interested parties. Reclamation sent the press release to ten newspapers on May 28, 1999 with the dates and locations of the scoping meetings. The memorandum was sent on June 9, 1999 to nearly 530 interested parties.

PUBLIC SCOPING MEETINGS

Four public scoping meetings were held within the Colorado River Basin (including the Southern California service area) as part of the scoping process. The location, date, attendance and number of oral comments received at each meeting are summarized in Table 1.

Table 1

Summary of Scoping Meetings

Date	Location	Number Attending	Number Speaking
June 15, 1999	Phoenix, AZ	34	4
June 16, 1999	Ontario, CA	12	1
June 22, 1999	Las Vegas, NV	32	6
June 23, 1999	Salt Lake City, UT	15	2

ISSUES RAISED THROUGH SCOPING MEETINGS

A total of 35 response letters and eight oral responses (several individuals and organizations made both oral and written comments) were received during the scoping process.

To assist in understanding public concerns, a list of all responses including the name of the person commenting, their organizational affiliation, if any, and the subjects which they commented on is included in Table 2. A review of the responses helped identified areas of concern. The review used a list of five areas to categorize the responses:

- Authorized project purposes (32 comments, 26% of the comments)
- Habitat (12 comments, 10%)
- Socio-economic (11 comments, 9%)
- Special concerns (10 comments, 8%)
- Process (57 comments, 46%)

Typically the responses included comments in several different categories and often had several thoughts in a single category. For purposes of quantifying the public concerns, multiple thoughts in a single category contained in a single response were only counted once.

AUTHORIZED PROJECT PURPOSES

The Boulder Canyon Project Act identified five authorized project purposes: navigation, flood control, water supply, recreation and power. Nineteen (19) of the 32 comments in this category focused on water supply. There was no single focus of these water supply comments. Only one comment was received on navigation and the concern with regard to navigation was not identified.

HABITAT

The twelve (12) comments on habitat were wide ranging. There were no concerns expressed over air quality.

SOCIO-ECONOMIC

The comments on Socio-economic concerns were highly focused. All eleven addressed the regional distribution of water supply. This high level of concern is due to recognition that the allocation of surplus water and impacts of shortages are not equally shared among all users of Colorado River water. There were no concerns raised with possible impacts on land use, social conditions or growth inducing impacts. Note that the comments on project purposes discussed previously could also be considered socio-economic.

SPECIAL CONCERNS

The ten comments received within the area of Special Concerns noted the potential impacts of the Interim Surplus Criteria on Indian Issues (predominately reliability of water supply) and on obligations to Mexico.

PLAN FORMULATION PROCESS

The 57 comments received on the process to be followed dominated the letters. Many had specific alternatives they wanted considered. Most significant among those were supporters of the "Six States Plan" and supporters of the "California Plan". Additional remarks included opinions as to whether or not the Long-Range Operating Criteria should be modified to implement to Interim Surplus Criteria,

concerns that the alternatives address the impacts on Lake Powell and three requests for additional time to respond.

Table 2
Colorado River Interim Surplus Criteria -- Analysis of Public Scoping Meetings & Response Letters

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat									Socio-economic				Special concerns			Process						Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues		
1			Pamela Hyde	Executive Director	Glen Canyon Institute			1										1						1			1		1			**Water Supply:** Increased water from surpluses increases dependency in-lieu of alternative supplies or conservation. **Alternatives:** Analysis based on no storage available at Lake Powell. **Need for Development of Surplus Criteria:** LROC is inadequate. Wants criteria established. **Habitat:** Increased consumptive use reduces instream uses. **Other Process**: Wants full NEPA.
2			Joe Muniz (faxed by Jessica Aberly, att.)	Chairman, Jicarilla Apache Tribe	Colorado River Basin Tribes Partnership ("Ten Tribes Partnership")			1																1					1			**Water Supply and Indian Issues:** May impact tribes' water supply rights. **Other Process**: Tribes need funding for technical assistance in review of study. Tribes need more time to comment on Scope.
3			Maureen George	City Attorney	Lake Havasu City			1													1											**Water supply & Regional:** Concerned with impact of shortages on City and AZ. Some cities along river do not have supplemental source to river.
4			Rachel Thomas	President	Arizona People for the USA																								1			**Other Process:** Request extension to comment period.
5			Joe Muniz (original of letter 2)	Chairman	CO River Basin Tribes Partnership																											Original of letter No. 2. (Boxes checked at letter only to avoid double counting)
6			Donald R. Pope	Manager	Yuma County Water Users' Association		1	1							1									1	1	1	1					**Criteria Format:** No need to revise LROC. **Need for Development of Surplus Criteria**: More definitive criteria needed, but w/i framework of AOP. **Mexico:** Need more specific guidelines for surpluses to Mexico. **Water Supply & Alternatives:** Favor more liberal definition of surplus -- 50% or 30% flood probability should trigger surplus releases. **Flood Control & Geology**: Hoover releases in excess of 19,000 cfs cause flooding/high groundwater on 25,000 ac of farm land. Also subject to flooding: Gila Valley, City of Yuma, County of Yuma, Cocopah Indians, Yuma Project, Bard ID, Quechan Tribe.
7			Tom Levy	Gen. Managr & Ch Eng'r	Coachella Valley Water District			1																	1	1	1			1		Support comments of Colorado River Board of California.
8			Stanley M. Pollack	Water Rights Counsel	The Navajo Nation, Dept of Justice, Natural Resources Unit.																			1					1			**Indian Issues**: May impact tribal water rights. **Other Process**: Tribes need more time to comment on Scope.

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat								Socio-economic				Special concerns			Process					Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues	
9			Larry J. Paulson, Ph.D. (via e-mail) (reference No. 25 also)	Citizen	Public (member of Lake Mead Water Quality Forum & SNWA Water Quality Citizens Advisory Committee)			1							1						1					1	1				**Water Supply, Water Quality & Regional:** In favor of lower levels at Lake Mead to reduce evaporation. Concerned with hierarchy of beneficial uses (see oral comments O-6) NV needs more than 4%. NV relies of credits due to return flows of treated wastewater and contaminated groundwater to Lake Mead via Las Vegas Wash. **Criteria Format:** Follow NEPA. **Alternatives:** Operate Mead to reduce evaporation.
10			Peter H. Evans (via fax) (original received 7/6/99)	Director	State of Colorado, Colorado Water Conservation Board, Department of Natural Resources			1													1					1					**Alternatives & Regional:** Will not favor any alternative which isn't tied to CA 4.4 Plan (specific steps are listed). Needs to allocate surpluses among states. Banking in CA of Co River water limited to when a reservoir spill is otherwise imminent. Must be interim. Must examine & mitigate increased risk of shortage on AZ & NV. Includes a proposed criteria. Extra M&I water to CA must be incremental to other sources available to CA. **Water Supply & Regional:** Concerned that balancing between Mead and Powell and more liberal criteria at Mead will lead to lowering Powell and impacts on Upper Basin supply.
11			Robert S. Lynch, Attny (via fax-original rec'd 7/6/99)	Chairman of the Board	Central Arizona Project Association					1															1		1			**Need for development of surplus criteria:** Not needed. **Implementation Options:** Don't change LROC. **Power:** Study 1083 elevation and gauge power impacts.
12			Manuel R. Ybarra (via fax) (original rec'd 7/6/99)	Secretary	International Boundary and Water Commission																	1								**Mexico:** Must meet treaty obligations. **Water quality:** Salinity of water delivered to Mexico.
13			Rita P. Pearson (via fax) (original rec'd 7/6/99)	Director	Arizona Department of Water Resources		1	1	1	1								1			1			1		1	1			**Criteria Format & Need for development of Surplus Criteria:** No change in LROC is needed. **Regional Impacts:** AZ is particularly sensitive to shortages. Power: Normal water deliveries probably maximize power. **Flood control & Geology:** Minimize flood damage. High flows cause water logging and increase need for drainage pumping in Yuma Area (per oral comments). **Recreation & Environment:** Balance these purposes.
14			Gregory Oleson	Corporate Counsel	US Filter																			1		1			1	**Criteria Format & Legal Issues:** Criteria should address & establish consistency w/ exist laws. **Alternatives:** Emphasize efficiencies of water markets.

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat								Socio-economic				Special concerns			Process					Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues	
15			William J. Snape, III and John A. Fritschie (via fax-original rec'd 7/6/99)	Legal Director Litigation Counsel	Defenders of Wildlife								1	1			1	1					1	1				1				**Colorado River Delta:** Cottonwood-willow forests depend on spills. **Need for development of surplus criteria:** Dire need for specific criteria for surplus, shortage and normal years. **Endangered Species:** Compliance with Endangered Species Act. **Other issues:** Letter listed others without discussing, they have been checked off.
16			Bernadine Boyd (via fax-original rec'd 7/6/99)	President, Tribal Council	Fort McDowell Indian Community			1																1							**Water supply & Indian Issues:** Water supply must be reliable.
17			Gordon W. Fassett (via fax - original rec'd 7/6/99)	State Engineer	Wyoming State Engineer's Office																				1	1					**Need for development of Surplus Criteria:** Support development of both Surplus and Shortage criteria. **Criteria Format:** Don't modify LROC.
18			Larry R. Dozier (via fax)	Deputy General Manager	Central Arizona Project (Central Arizona Water Conservation District)			1		1											1				1	1	1				**Criteria Format:** NEPA process not required. Use the AOP process. **Alternatives & Regional:** AZ is impacted first by shortages. Thus consider shortages. CA to comply with 4.4. AZ to get RRA Section 215 waiver. **Power & Regional:** CAP is largest AZ user of Hoover B & C power allocation (from 15 Jun hearing comment O-3)
19			Wayne E. Cook (via fax) (original received 7/6/99)	Executive Director	Upper Colorado River Commission																				1	1					**Criteria Format:** NEPA process not required. Use the AOP process. **Alternatives:** Concur with Six Basin States Proposal recommendations.
20			D. Larry Anderson, P. E. (via fax)	Director	State of Utah, Dept of Natural Resources, Div of Water Resources																				1	1	1				**Need for development of Surplus Criteria:** Concur. **Alternatives:** Dependent on CA 4.4 Plan. Criteria **Format:** Oppose changes to LROC.

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat									Socio-economic				Special concerns			Process					Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues	
21			Richard Bunker and Patricia Mulroy (via fax)	Chairman General Manager	Colorado River Commission of Nevada & Southern Nevada Water Authority			1												1						1	1				**Water supply:** M&I uses should be higher priority than before other uses. **Alternatives:** Depend on CA efforts and success with 4.4 Plan. Must address shortages. **Format for the criteria:** Do not incorporate into LROC. Use AOP as vehicle it implement criteria. **Other process:** Develop specific surplus criteria prior to NEPA process. **Regional:** States have special role.
22			Tim Henley	Manager	Arizona Water Banking Authority			1													1						1			1	**Water supply:** Generally in favor of more liberal surplus as long as shortage addressed. **Legal:** Consistent w/ AZ vs. CA. **Also,** concur w/AZ DWR comments.
23			Michael Cohen	Research Associate	Pacific Institute for studies in development, environment, and security.								1											1			1			1	**Alternatives:** Address shortages include climate changes. **Other process:** Include range of consumption scenarios, include water conservation. **Colorado River Delta**: Cottonwood-willow forests depend on spills. **Endangered species:** Include formal Section 7 consultations w/USF&W. **Mexico:** Mexico has surplus rights under '44 treaty. (Oral Comments O-7).
24			Roger Manning	Executive Director	Arizona Municipal Water Users Association		1	1	1	1								1									1	1			Concur with AZ DWR comments.
25			Larry J. Paulson, Ph.D.	Citizen	Public																									See letter 9. (Boxes checked at letter 9 only to avoid overcounting)
26			William I. Jackson, Ph.D. (via fax-original rec'd 7/6/99)	Chief, Water Operations Branch	National Park Service	1			1		1							1								1	1	1			**Criteria Format:** Support NEPA process. **Recreation & Habitat in General:** Dependent on frequency of spills from Powell & impacted by flows. Liberal surplus criteria will reduce natural spills. **Recreation and Fishery Habitat:** Impacts when Powell below 3,650. **Navigation:** Issue when Mead below 1170. **Alternatives:** Prefer fuller reservoirs. **Need for development of surplus criteria:** In favor.
27			Gerald R. Zimmerman	Executive Director	Colorado River Board of California			1																	1	1	1			1	**Alternatives:** Must have specific term. Contain 3 tiers of surplus. **Criteria Format:** Develop pursuant to LROC & use in conjunction w/LROC to develop AOP. **Need for Development of Surplus Criteria & Water Supply:** Exist criteria does not optimize Water Supply. **Other Process:** Dependent on Cal 4.4 Plan & agreements internal to CA, or comments don't apply.
~~28~~				~~Cental Arizona Project~~																											Original of No 18 Fax.
29			Jay B. Burnham	City Attorney	City of Farmington			1													1									**Water Supply & Regional:** Upper Basin will in future need more than allocation & should have rights to surplus flows.

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat									Socio-economic				Special concerns			Process					Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues	
30			R. Eric Kuhn	Secretary/ General Manager	Colorado River Water Conservation District			1	1	1											1										**Water Supply & Regional:** Oppose increased drawdown of Powell caused by equalization. **Recreation and Power:** Drawdown of Powell would adversely affect both. **Alternatives:** Must be tied to CA 4.4 Plan. Must be interim. Modify or eliminate equalization. **Also:** Endorse comments of Colorado Water Conservation Board.
31			Ronald R. Gastelum	General Manager	Metropolitan Water District of Southern California			1																	1	1	1		1	Concur with Colorado River Board comments.
32			Thomas C. Havens	President	American Water Resources,Inc.																							1		**Other process:** Need to address 50 to 100 year path rather than short term.
33			Philip B. Mutz	Upper CO River Commissioner for NM	New Mexico Interstate Stream Commission																				1	1	1			**Need for Development of Surplus Criteria:** Not until CA 4.4 Plan is developed. **Criteria Format:** Use the Annual Operating Plan. **Alternatives:** Short term strategy must terminate if CA doesn't make progress.
34			John Penn Carter	Attorney, Horton, Knox, Carter & Foote	Imperial Irrigation District																							1		**Other Process:** Concur with Colorado River Board of CA comments only if settlement of issues being negotiated by CRB agencies. Otherwise, reopen comment period to allow IID & other CA agencies to submit independent comments..
35			Nino J. Mascolo		Southen California Edison Co.																									No comments, but interested in water banking.
O-1	15-Jun	49	Herb Dishlip	Assistant Director	AZ DWR																									See letter 13. (Boxes checked at letter only to avoid double counting)
O-2	15-Jun	57	Larry Dozer	Deputy General Manager	Central Arizona Project (Central AZ Water Conservation District)																									See letter 18. (Boxes checked at letter only to avoid double counting)
O-3	15-Jun	61	Bob Lynch	Chairman	Central Arizona Project Assoc.																									See letter 11. (Boxes checked at letter only to avoid double counting)
O-4	16-Jun				No comments at this hearing.																									There were no comments at the 16 Jul scoping meeting.

Letter #/Oral Comment #	Meeting Date	Transcript Page	Name	Position	Organization	Authorized project purposes					Habitat									Socio-economic				Special concerns			Process						Remarks (Note: "1" is used throughout as an indicator that can be computed by Excel. There is no ranking or priority associated with this digit)
						Navigation	Flood Control	Water Supply	Recreation	Power	Fishery Habitat	Backwater Channel	Colorado River Delta	Endangered Species/ESA	Water Quality	Air Quality	Salton Sea	Other habitat/ general	Land Use Change	Social Conditions	Regional Impacts	Growth-inducing	Mexico	Indian Issues	Geology	Alternatives	Criteria Format	Need for Development of Surplus Criteria	Other Process	Legal Issues	
O-5	22-Jun	28 & 35	Donald Pope	Manager	Yuma County Water Association																										See letter 5 (Boxes checked at letter only to avoid double counting).
O-6	22-Jun	31 & 41	Larry Paulson		Public																										See letter 9. (Boxes checked at letter only to avoid double counting).
O-7	22-Jun	33	Mike Cohen		Pacific Institute for Studies in Development, Environment and Security.																										See letter 23. (Boxes checked at letter only to avoid double counting).
O-8	22-Jun	36	Mary Manning		Las Vegas Sun Newspaper			1																							**Water Supply:** Consider extended drought.
O-9	23-Jun	29	Brent Israelsen		Salt Lake Tribune			1													1										**Water Supply and Regional:** Estimation of Upper Basin depletions.
					Comments by category	1	3	19	4	5	1	0	2	1	2	0	1	5	0	0	1	0	3	5	2	16	16	13	7	5	
					Comments by group	32					12								1				10			57					
					Total comments	122																									

ATTACHMENT S

Correspondence with U.S. Fish and Wildlife Service and National Marine Fisheries Service

This attachment contains correspondence between Reclamation and the U.S. Fish and Wildlife Service on Section 7 consultation regarding the potential effects of interim surplus criteria downstream on listed species and upstream of Lake Mead in the United States, and in the Colorado River Delta area of Mexico. Downstream of Lake Mead the consultation also addressed changes in water delivery points under California's Colorado River Water Use Plan. Upstream of Lake Mead the consultation involved minor operational changes of Glen Canyon Dam operation on evaluation of the effects from the Colorado River corridor below Glen Canyon Dam. Consultation with the National Marian Fisheries Service addressed effects on aquatic species in the Colorado River estuary and the upper Sea of Cortez.

Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:

LC-2011
ENV-7.00

MAY 2 2 2000

MEMORANDUM

To: Mr. David Harlow, State Superintendent, Arizona Ecological Services, 2321 W. Royal Palm Road, Suite 103, Phoenix AZ 85021

From: William E. Rinne, Area Manager
Boulder Canyon Operations Office

Subject: Species List for Conducting an Accounting of the Potential Effects of Interim Surplus Criteria, Elements of the California Water Plan Requiring the Secretary of the Interior's Approval, and Associated Conservation Measures on Listed or Proposed Species and Designated or Proposed Critical Habitat

Per 50 CFR §402.12(c), this is a request for a list of any listed or proposed species or designated or proposed critical habitat that may be present in the action area. Based on our previous discussions and pending a determination of effects, if any, on the reach of the Colorado River from immediately above Lake Mead to flows into Lake Powell, the minimum action area for the proposed actions encompass the lower Colorado River from Lake Mead to the southerly international boundary, including the 100-year flood plain and Lakes Mead, Mohave, and Havasu to full pool elevations.

The actions being considered in this accounting are (1.) interim surplus criteria which is intended to provide surplus water (that above a normal year of 7.5 million acre-feet) to the lower basin states (AZ, CA, NV) for a period of 15 years (2001-2015), (2.) Secretary's approval, via implementation agreements with California, for the transfer of up to 400,000 acre feet/year of California's entitlement water from the current diversion at Imperial Dam to an up stream point of diversion at Lake Havasu, and (3.) associated conservation measures that may be developed as part of the action subject to the accounting of effects. Detailed descriptions of these actions are being prepared.

Based on our previous consultation (1996-97) on lower Colorado River operations and maintenance and recent discussions among our staffs, the effects of the proposed actions on the following species and critical habitat will be determined:

- Endangered: Southwestern willow flycatcher, brown pelican, Yuma clapper rail, razorback sucker, and bonytail
- Threatened: Desert tortoise

- Potential Proposed: Black rail, yellow-billed cuckoo
- Critical Habitat: Bonytail and razorback sucker

Your concurrence or modification of this list is requested.

If you have questions regarding this request and the action elements, please contact Tom Shrader at 702-293-8703.

/s/ William E. Rinne

cc: Ms. Nancy Kaufman
Regional Director
Region Two
Fish and Wildlife Service
PO Box 1306
Albuquerque NM 87103-1306

Mr. Mike Spear
California-Nevada Operations Manager
Fish and Wildlife Service
2800 Cottage Way, Room W-2606
Sacramento CA 95825

Mr. Ken Berg
Field Supervisor
Fish and Wildlife Service
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad CA 92008

bc: Commissioner,
Attention: W-6333
Regional Director, Boulder City NV
Attention: LC-2010, LC-2311, LC-2312, LC-2316
Regional Director, Salt Lake City UT
Attention: UC-438, UC-720
Area Managers,
Attention: YAO-1000, YAO-1400, YAO-2200, BCOO,1000, BCOO-1010, BCOO-4400, BCOO-4600

In Reply Refer To:
AESO/SE
2-21-00-I-273

June 5, 2000

6-13 AR 1200 4600

Memorandum

To: Area Manager, Boulder Canyon Operations Office, Bureau of Reclamation, Boulder City, Nevada

From: ACTING Field Supervisor

Subject: Request for Concurrence with Species List for Potential Effects of Interim Surplus Criteria, Elements of California Water Plan Requiring Secretary of the Interior's Approval, and Associated Conservation Measures on Listed and Proposed Species and Designated or Proposed Critical Habitat

The Fish and Wildlife Service has reviewed the list of listed, proposed and candidate species in your memorandum dated May 22, 2000 for the subject project. We concur with the list of species provided, with the addition of the following species to your list.

Bald eagle (Haliaeetus leucocephalus)
Desert pupfish (Cyprinodon macularius)

This list does not include species found in or adjacent to the Colorado River above Lake Mead. Should the impact area of the project be expanded to include the Colorado River above Lake Mead, please contact us to obtain a list of species to be considered for that area. This list also does not include any species found in the Republic of Mexico that are not found in the United States. Species under jurisdiction of the National Marine Fisheries Service are also not included in this concurrence.

If there are any questions regarding this list of species, please contact Lesley Fitzpatrick (x236) or Tom Gatz (x240).

for David L. Harlow

surplus species list:LAF:kh

OFFICE OF THE SOLICITOR
Washington, D.C. 20240

IN REPLY REFER TO:

1849-1999

AUG 14 2000

Memorandum

To: Eluid L. Martinez, Commissioner, Bureau of Reclamation

From: John Leshy, Solicitor, U.S. Department of the Interior

Subject: Interim Surplus Guidelines and the Endangered Species Act – Possible Effects in the Republic of Mexico

The Secretary of the Interior currently manages the lower Colorado River system in accordance with federal law, including the 1964 Decree of the U.S. Supreme Court in *Arizona v. California*, the Colorado River Basin Project Act of 1968 (CRBPA), and Long Range Operating Criteria (LROC) adopted pursuant to the CRBPA. Within this legal framework, the Secretary makes annual determinations regarding the availability of surplus water from Lake Mead, by considering various factors, including the amount of water in storage and predictions for natural runoff. The 1964 Decree provides that if sufficient mainstream Colorado River water is available for release (primarily from Lake Mead) to satisfy annual consumptive use in the states of Arizona, California, and Nevada in excess of 7.5 million-acre feet, as determined by the Secretary, such excess consumptive use in Arizona, California and Nevada is "surplus."

Interim Surplus Guidelines currently being developed by the Bureau of Reclamation are intended to be used by the Secretary through the year 2015 in making annual determinations of surplus conditions. Reclamation is preparing these guidelines in compliance with applicable federal law, including the provisions of the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). An issue has arisen whether Reclamation must, as part of its ESA compliance, consider any effects of the proposal to adopt these guidelines on species in Mexico listed as endangered or threatened under the Endangered Species Act. This issue is complex, involving analysis of international treaties, domestic statutes and regulations, as well as the Supreme Court's 1964 Decree. Its resolution has attracted considerable attention outside as well as inside the Executive Branch.

I am in the process of analyzing this issue and discussing it with the Department of Justice and the Department of Commerce, as well as other agencies in Interior. Among other things, I am reviewing statements made on behalf of the United States in prior litigation such as Defenders of Wildlife v. Lujan, 504 U.S. 555 (1992), and considering the recent complaint filed in D.C. District Court challenging the adequacy of Reclamation's existing Lower Colorado ESA compliance. Defenders of Wildlife, et. al. v. Babbitt, et al., No. 1:00CV01544 (D.D.C. filed June 28, 2000).

The adoption of interim surplus guidelines is a high priority for Secretary Babbitt, and it is important that we move that process forward. Therefore, while we continue our internal discussions on this complex legal issue, consultation between Reclamation and agencies with consultation responsibility over the species involved (the U.S. Fish and Wildlife Service and the National Marine Fisheries Service) should continue. The continuation of consultation does not reflect any conclusion on our part that consultation is required, as a matter of law or regulation, on any possible impact the adoption of interim surplus guidelines may have on U.S.-listed species in Mexico. Rather, Reclamation's consultation on these effects should proceed with the express understanding that it may exceed what is required under applicable federal law and regulations and does not establish a legal or policy precedent. The exchange of information between Reclamation and the consulting agencies during this consultation may prove useful in any event, such as for use in any future discussions with the Republic of Mexico pursuant to section 8 of the ESA, which directs the Secretary to promote the conservation of listed species beyond our borders, including by agreements with foreign governments. ESA § 8(b). I understand that much of this information is already available in Reclamation's Draft EIS on this project.

The ongoing discussions with the consulting agencies should also take into consideration the fact that the United States cannot unilaterally control hydrologic conditions in the Colorado River south of the international boundary. Under the terms of the U.S.-Mexican Water Treaty of 1944, waters of the Colorado delivered to the Republic of Mexico are subject to its control, and the treaty contains no provisions requiring Mexico to use any of that water for species preservation in the Delta. Finally, the discussions should take into account mandates and limitations on Reclamation's actions pursuant to the Supreme Court's 1964 Decree. Because of the unique complexity of this situation, if these discussions produce suggestions for measures to minimize or avoid adverse effects on listed species, we will need to review them to determine their consistency with these various legal requirements.

Please contact me if you have any questions or concerns regarding this matter.

cc: Jamie Clark, Director, U.S. Fish and Wildlife Service
Penny Dalton, National Marine Fisheries Service

TOTAL P.03

Boulder City, NV 89006-1470

IN REPLY REFER TO:
BCOO-1000
ENV-7.00

AUG 31 2000

MEMORANDUM

To: Mr. David Harlow, Field Supervisor, US Fish and Wildlife Service, 2321 West Royal Palm Road, Suite 103, Phoenix AZ 85021-4951

From: Mr. William E. Rinne
Area Manager

Subject: Final Biological Assessment and Request for Formal Section 7, Endangered Species Act(ESA), Consultation on Interim Surplus Criteria (ISC), Secretarial Implementation Agreement (SIA) for California Water Plan Components, and Conservation Measures (August 2000)

Reclamation requests formal consultation with the Fish and Wildlife Service (FWS) pursuant to section 7 of the ESA for the above referenced actions. The Secretary of the Interior, acting through Reclamation, is considering the adoption of specific ISC under which surplus water conditions may be declared in the Lower Colorado River Basin and the execution of SIAs that provide for a change in point of delivery of Colorado River water for use within California. Several conservation measures would also be implemented as part of these proposed actions.

The attached Biological Assessment was prepared to evaluate the likely effects of these proposed actions on listed species or critical habitat as required by the ESA. The Biological Assessment includes determinations that the proposed action may affect the endangered Southwestern willow flycatcher, Yuma clapper rail, razorback sucker, and bonytail chub; and may adversely modify critical habitat for the razorback sucker.

An initial draft of the Biological Assessment was provided to your office and to applicants for the SIAs on August 15, 2000, for review. We have subsequently considered comments received from the FWS and two applicants, San Diego County Water Authority and Imperial Irrigation District, in revising the attached Biological Assessment. Copies of the applicant comment letters are

your August 22, 2000 memorandum are provided in the remainder of this memorandum.

After further consideration, we have decided to limit this consultation to the ISC, SIAs and associated conservation measures. The water administration and quantification of priority 3 agricultural entitlements are no longer part of the proposed actions, and therefore, have been removed from the attached Biological Assessment.

We have also provided more information, beginning on page 35 of the Biological Assessment, on how any indirect effects associated with the proposed actions will be addressed. The overall approach is to assure ESA coverage for any indirect effects of the ISC and SIAs, through either section 10 permits issued with the adoption of Habitat Conservation Plans (HCPs) and/or project specific section 7 consultations, if necessary.

With regard to your suggestion to raise the river bed to offset aquatic impacts of all Lower Colorado Region operations, we believe the viability of this option should continue to be evaluated through the Multi-Species Conservation Program (MSCP) process. As we have discussed before, this option addresses issues beyond these proposed actions and would be difficult and very expensive to implement and sustain on such an incised channel and a sediment deficient hydrology.

Based on our mutual discussions during our meetings of August 15 and 18, 2000, we had not settled on a replacement ratio for backwater, marsh, and riparian habitat. We agree that should any habitat be lost, it is likely that it will be necessary to provide habitat in excess of that lost to achieve equal value of replacement. However, we do not believe that a specific replacement ratio for this consultation is appropriate in light of the following circumstances: 1) changes in point of delivery on the Colorado that result from conservation and transfer activities will ramp up gradually and likely not reach 200,000 acre-feet before 2008, 2) potential impacts are based on a maximum movement of 400,000 acre-feet with a lesser amount being more likely, 3) it is not certain that there will be any impacts to occupied flycatcher habitat from a decline in groundwater levels, and 4) Reclamation has previously committed to work with the MSCP Partners on a long-term on and off site compensation plan for historical flycatcher habitat as specified in RPA 11 of the April 30, 1997, Biological Opinion on Lower Colorado Rivers operations and maintenance. Because much remains to be refined with regard to flycatcher habitat needs regarding moist soils, micro climate, food base requisites and others factors, we think it is better to commit to replacement of any of the 372 acres of

restore, protect and/or enhance approximately 124 acres of riparian habitat primarily for the southwestern willow flycatcher and 62 acres of restored or replaced backwater and marsh habitat. By undertaking these activities in the near future instead of when effects occur, Reclamation will be able to ensure that the acreage of compensation habitat will always be in excess of any losses due to the proposed actions, thereby fulfilling our responsibilities under the ESA.

Since our working generalization for potential flycatcher habitat is based solely on subjective height densities for habitat types, and has no further refined classification for moist soils, micro climate, and food base requisites, we feel it is inappropriate to compensate for an unknown amount of habitat with a specific predetermined ratio until complete site suitability is determined on the basis of known requisites.

With regard to any potential effects of the proposed adoption of ISC on ESA listed species in the Republic of Mexico or the Gulf of California, Reclamation is preparing additional information that will supplement this assessment. We will provide this additional information to your office along with the National Marine Fisheries Service in the near future. The purpose of providing this additional information is to address effects, if any, of the proposed adoption of ISC on ESA listed species in the Republic of Mexico. This information will be provided pursuant to and consistent with guidance we have received from the Solicitor of the Department of the Interior (see Solicitor John Leshy's Memorandum of August 14, 2000, to Mr. Eluid Martinez, Commissioner, Bureau of Reclamation). His memorandum provided that, "The continuation of consultation does not reflect any conclusion on our part that consultation is required, as a matter of law or regulation, on any possible impact the adoption of interim surplus guidelines may have on US listed species in Mexico. Rather, Reclamation's consultation on these effects should proceed with the express understanding that it may exceed what is required under applicable Federal law and regulations and does not establish a legal or policy precedent."

After the document was printed for distribution, a last minute correction in the model run for changes in elevation for the river solely for the month of April, was required as a result of change in point of diversion. The net effect of this revision will be that predicted impacts to backwater and river surface area will be slightly less (<12%) than shown in the document, and any corresponding adjustment in conservation measures will be similarly revised. As soon as the corrected elevations are integrated into the Geographic Information Systems model, the new analysis will be distributed.

statements and the content of the Biological Assessment. We express our appreciation to you for the time that you and your staff have dedicated to this priority undertaking by the Department of the Interior, your agreement to an accelerated consultation schedule, and your willingness to meet with the California applicants. We look forward to resolving any continuing issues with you and the applicants. In order to keep the applicants advised as to the status of the consultation, they will be provided a courtesy copy of this memorandum and its attachment.

Please contact me at (702) 293-8414 if you have additional questions or would like to schedule a meeting to discuss further.

WILLIAM E. RINNE

Attachments

cc: Mr. Larry Purcell
Water Resources Manager
San Diego County Water Authority
3211 Fifth Avenue
San Diego CA 92103-5718

Mr. John R. Eckhardt
Assistant to the General Manager
Imperial Irrigation District
PO Box 937
Imperial CA 92251

Mr. Dennis Underwood
Executive Director to the General Manager
Metropolitan Water District of
Southern California
PO Box 54153
Los Angeles CA 90054-0153

Mr. Tom Levy
General Manger-Chief Engineer
Coachella Valley Water District
PO Box 1058
Coachella CA 92236

Congressional Facilitator
San Luis Rey Settlement Parties
220 West Grand Avenue
Escondido CA 92025
(w/att to ea)

bc: Director, Operations
Attention: W-6333
Field Solicitor, Washington DC
Attention: Robert Snow
Field Solicitor, Phoenix AZ
Attention: Joan Card
Area Manager, Yuma AZ
Attention: YAO-1400, YAO-2200
(w/att to ea)

LC-2011, LC-2311, LC-2312, LC-2316
(w/o att to ea)

Upper Colorado Regional Office
125 South State Street, Room 6107
Salt Lake City, Utah 84138-1102

IN REPLY REFER TO:
UC-720
ENV-7.00

NOV 2 9 2000

MEMORANDUM

To: Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services Office, Region 2, Arizona State Office, 2321 W. Royal Palm Road, Suite 103, Phoenix, AZ 85021-4951

From: Acting for Charles A. Calhoun
Regional Director

Subject: Finding of "May Affect, Not Likely to Adversely Affect" for Listed Species Which May Be Present in the River Corridor Below Glen Canyon Dam Due to Minor Operational Changes Resulting From the Secretary of the Interior's proposed Adoption of Interim Surplus Criteria; Supplemental Information to the August 30, 2000 Biological Assessment

The Secretary of the Department of the Interior (Secretary), acting through the Bureau of Reclamation is considering the adoption of specific interim criteria under which surplus water conditions may be declared in the lower Colorado River Basin during a 15-year period that would extend through 2016. As the agency which is designated to act on the Secretary's behalf with respect to this action, Reclamation is preparing an Environmental Impact Statement to evaluate the potential effects of adopting interim surplus criteria. As a part of this process, the potential effects on listed species from the headwaters of Lake Mead to the Southerly International Boundary with Mexico were evaluated in a biological assessment which was transmitted to the U.S. Fish and Wildlife Service (Service) on August 30, 2000.

Preliminary evaluations of the effects of adopting interim surplus criteria indicated that minor modifications to the operations of Glen Canyon Dam were within the range of operations previously evaluated by the Service in a December 21, 1994, Biological Opinion (FWS, 1994). The proposed minor changes to operations would not preclude the continued implementation of the previously agreed to reasonable and prudent alternative, or the functioning of the Adaptive Management Program. We concluded that these minor changes would have no affect on listed species occurring along the river from Glen Canyon Dam to the headwaters of Lake Mead. For these reasons, that area was not included in the biological assessment.

Since that time we have updated the model used to predict future dam operations and riverflows and determined that there would be a minor change in the frequency with which Beach/Habitat-Building flows and low steady summer flows as recommended in the opinion would be triggered.

Mead. We have also determined there would be no adverse modification of critical habitat.

This memorandum serves to document the re-evaluation of potential impacts to listed species from Glen Canyon Dam to the headwaters of Lake Mead based on the updated model runs. This data was discussed with your Phoenix, AZ staff on November 8, 2000. We would appreciate your concurrence or response to our finding of 'may affect, not likely to adversely affect' and 'no adverse modification of critical habitat' at your earliest convenience. Should you have additional questions or concerns feel free to contact me or a member of my staff at (801) 524-3600.

Attachment

CC: UC-105, -700, - 438, - 432, - 433
LC-1000, -2011, -2311, -1050
U.S. Department of the Interior, Office of the Solicitor, 1849 C. Street N.W. Washington D.C. 20240 Attention: Robert Snow MS-6412-MIB
U.S. Fish and Wildlife Service, Ecological Services Office, Region 2 Arizona State Office, 2321 Royal Palm Road Suite 103, Phoenix, AZ 85021-4951
Attention: Debra Bills, Leslie Fitzpatrick, Thomas Gatz
U.S. Fish and Wildlife Service, Ecological Services Office, Region 2, PO Box 1306, Albuquerque, NM 87103 Attention: Steve Helfert
Navigant Consulting, 225 W. Broadway, Suite 400, Glendale, CA 91204

Background

The Secretary of the Interior (Secretary) is vested with the responsibility of managing the mainstem waters of the lower Colorado River pursuant to applicable federal law. This responsibility is carried out consistent with a collection of documents known as the *Law of the River*, which includes a combination of federal and state statutes, interstate compacts, court decisions and decrees, an international treaty, contracts with the Secretary, operating criteria, regulations and administrative decisions.

The Colorado River Basin Project Act of 1968 directs the Secretary to adopt criteria for coordinated long-range operation of reservoirs on the Colorado River in order to comply with and carry out the provisions of the Colorado River Compact, the Colorado River Storage Project Act, the Boulder Canyon Project Act of 1928, and the United States-Mexico Water Treaty of 1944. Collectively, these criteria are the Long-Range Operating Criteria (LROC). The 1922 Colorado River Compact apportioned the exclusive beneficial consumptive use of 7.5 million acre feet of water a year to the Upper Basin and 7.5 maf of water a year to the Lower Basin. The LROC define a *normal year* as a year in which annual pumping and release from Lake Mead will be sufficient to satisfy 7.5 maf of consumptive use in accordance with the Decree entered by the United States Supreme Court in 1964 in the case of *Arizona V. California*. If there exists sufficient water available in a single year for pumping or release from Lake Mead to satisfy annual consumptive use in the states of California, Nevada and Arizona in excess of 7.5 million acre-feet, such water may be determined by the Secretary to be available as "surplus" water. The Secretary is authorized to determine the conditions upon which such water may be made available. The Secretary is considering the adoption of specific interim criteria under which surplus water conditions may be declared in the lower Colorado River Basin during a 15-year period that would extend through 2016, in accordance with the LROC. The interim surplus criteria would be used annually to determine the conditions under which the Secretary may declare the availability of surplus water for use within the States of Arizona, California and Nevada.

The LROC are used by the Secretary, on an annual basis, to make determinations with respect to the projected plan of operations of the storage reservoirs in the Colorado River Basin. Reclamation released a Draft Environmental Impact Statement in July, 2000 which evaluated 5 alternatives for interim surplus criteria. The LROC require that, when Upper Basin storage is greater than the storage required under Section 602(a) of the Colorado River Basin Project Act, releases from Lake Powell are governed by the objective to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell. Because of this equalization provision, changes in operations of Lake Mead will, in some years, result in increases in annual release volumes from Lake Powell. It is through this mechanism that delivery of surplus water from Lake Mead can influence the operation of Glen Canyon Dam. The equalization requirement of Section 602(a) is suspended if water stored in the Upper Basin is not sufficient to meet Upper Basin demand during a critical low-runoff period.

Of the five alternatives evaluated, the preferred alternative (proposed action) is the Basin States Alternative. The Basin States Alternative specifies ranges of Lake Mead water surface elevations to be used through 2015 for determining the availability of surplus water through 2016. The elevation ranges are coupled with specific uses of surplus water in such a way that, if Lake Mead's surface elevation were to decline, the permitted uses of surplus water would become more restrictive, thereby reducing the delivery of surplus water. The interim criteria would be reviewed at five-year intervals or as otherwise needed based upon actual operational experience.

The surplus determination elevations under the preferred alternative consist of the tiered Lake Mead water surface elevations, each of which is associated with certain stipulations on the purposes for which surplus water could be used.

In acknowledgment that the operation of Glen Canyon Dam, as authorized, to maximize power production was having a negative impact on downstream resources, the Secretary determined in July 1989 that an Environmental Impact Statement should be prepared. The *Operation of Glen Canyon Dam EIS* developed and analyzed alternative operation scenarios that met statutory responsibilities for protecting downstream resources and achieving other authorized purposes, while protecting Native American interests. The final EIS was completed in March 1995 and the Secretary signed a Record of Decision (ROD) on October 8, 1996. The ROD describes criteria and plans for dam operations and included other measures to ensure Glen Canyon Dam is operated in a manner consistent with the Grand Canyon Protection Act. Reclamation also consulted with the Service under the Endangered Species Act and incorporated the Service's recommendations into the ROD. Also among the provisions of the ROD are an Adaptive Management Program and experimental flows.

The Adaptive Management Program provides a process for assessing the effects of current operations of Glen Canyon Dam on downstream resources and using the results to develop recommendations for modifying operating criteria and other resource management actions. This is accomplished through the Adaptive Management Work Group, of which the Service is a member. The AMP includes long-term monitoring and research activities that provide a continual record of resource conditions and new information to evaluate the effectiveness of operational modifications on downstream resources, including listed species. Through the AMP, testing and evaluation of releases recommended by the Service's biological opinion are being implemented. The releases are designed to verify a program of flows that would improve habitat conditions for listed species. Releases from Glen Canyon Dam for equalization purposes, due to the proposed interim surplus criteria, would affect the range of storage conditions in Lake Powell and alter the flexibility to schedule and conduct such releases or to test other flow patterns. The amount of this reduction in flexibility has been evaluated for the proposed action. Specifically, effects on the frequency of triggering beach/habitat-building flows and of low steady summer flows were estimated through the use of modeling and compared to the baseline conditions for the interim period to 2016, and for an additional period to the year 2050 to evaluate both short and long term effects.

Baseline conditions are the current conditions, or those conditions which would occur if interim surplus criteria were not adopted. If interim surplus criteria is not adopted, determination of surplus would continue to be made on an annual basis as part of developing the Annual Operating Plan, pursuant to the LROC and Decree. Consideration of factors such as end-of-year system storage, potential runoff conditions, and projected water demands of the Basin States would be considered. A specific operating strategy, which could be described mathematically in a computer model that simulates specific operating parameters and constraints, was selected as the baseline. This strategy is the "70R" spill avoidance strategy, which Reclamation has utilized for both planning purposes and studies in past years. The R strategy assumes a particular percentile historical runoff, along with normal 7.5 maf delivery to Lower Division states for the following year. Applying these values to the current reservoir storage, the projected reservoir storage at the end of the next year is calculated. If the calculated space available at the end of the next year is less than the space required by flood control criteria, then a surplus condition is determined to exist. The 70R strategy uses an annual runoff of 17.3 maf.

During preparation of the GCD EIS it was hypothesized that steady flows with a seasonal pattern may have a beneficial effect on the potential recovery of special status species down stream of Glen Canyon Dam. Accordingly, development of an experimental water release strategy was recommended by the Service in the December, 1994 biological opinion to achieve steady flows when compatible with water supply conditions and the requirements of other resources. The biological opinion recommended developing and verifying a program of experimental flows which would include high steady flows in the spring and low steady flows in summer and fall during water years of approximately 8.23 maf. The probability that conditions would occur allowing the testing and verification of these flows, know as low steady flows and beach/habitat-building flows, could be affected by the implementation of interim surplus criteria.

The probabilities that minimum releases of 8.23 maf would occur during the interim period to 2016 and during the subsequent period to 2050, were estimated using a mathematical model. The results indicate that under baseline conditions, the probability of an 8.23 maf annual release would be approximately 98.2 % of the years, during the interim period, and 61.6 % during the subsequent period to 2050. Under the propose d action, this probability would be approximately 36.3 % during the interim period, and 61.9 % during the subsequent period. This is an approximate reduction of 2.9 % in the probability of an 8.23 maf year during the interim period, and an increase in the probability of an 8.23 maf year of 0.3% during the subsequent period. Given the margin of error in forecasting runoff, this decrease of 2.9% in the probability of occurrence of an 8.23 maf year through 2016, and of 0.3 % through 2050 is insignificant, and would have no effect on the amount of take occurring due to ongoing conditions under the existing biological opinion when compared to the baseline condition. The AMP would remain in effect, the 1994 biological opinion would continue to be implemented, and reservoir operations would remain within the historical ranges.

We have therefore concluded that adoption of interim surplus criteria as described in the Basin States Alternative may affect, but is not likely to adversely effect any listed species occurring between Glen Canyon Dam and Separation Rapid, and that no critical habitat would be adversely modified.

The frequency at which BHBF releases from Glen Canyon Dam would occur under baseline conditions and under each of the interim surplus criteria alternatives was also estimated through use of the model. The model was configured to simulate BHBF releases by incorporating the BHBF triggering criteria into the Glen Canyon Dam operating rules. The model was also configured to make no more than one BHBF release in any given year. The effects of the interim surplus criteria alternatives on BHBF releases were analyzed in terms of the yearly frequency at which BHBF releases could be made, as indicated by the occurrence of one or both of the triggering criteria during a calendar year.

Under baseline conditions, the frequency of one or both BHBF flow release triggers occurring would be as follows: during the period through 2016 for which interim surplus criteria are being considered, the probability that BHBF releases could be made in a given year would be approximately 15.9 %, which is equivalent to about 1 year in 6. This yearly probability is an average over that period. During the subsequent period, ending in 2050, the average probability that BHBF releases could be made in any year would be approximately 13.5 %, which is equivalent to about 1 year in 7. The reduction in probability after 2016 under baseline conditions results from the fact that with time, the Lake Powell water level will probably decline because of increased Upper Basin depletions as the states develop their compact entitlements. The concept of BHBF releases developed in the Glen Canyon Dam Operations EIS was based on an estimated frequency of occurrence of 1 in 5 years. The difference occurs due to modeling refinements and changes in the forecasted upper basin depletion schedules received from the upper basin states through the Upper Colorado River Commission. Under the proposed action (the Basin States Alternative) the probability that BHBF releases would be triggered is approximately 14.8 %, and, during the subsequent period ending in 2050, the average probability that BHBF releases would be triggered would be 13.4 %. This is an approximate change in probability of 1.1% during the initial period to 2016, and of 0.1% during the remaining period of analysis, through 2050. Given the margin of error in forecasting runoff, this change is insignificant, and would not change the amount of take occurring due to ongoing conditions under the existing biological opinion when compared to the baseline condition. The AMP would remain in effect, the 1994 biological opinion would continue to be implemented, and reservoir operations would remain within the historical ranges.

ATTACHMENT T

Consultation with Mexico

This attachment consists of the following documents and correspondence prepared individually by the United States Section and the Mexico Section of the International Boundary and Water Commission (USIBWC and MIBWC, respectively), as part of the consultation between the United States and Mexico regarding the proposed interim surplus criteria.

Draft Authority and Assumptions governing the US-Mexico consultations on the proposed Colorado River interim surplus criteria prepared by the USIBWC, December 28, 1999;

Letter of May 22, 2000 from Commissioner J. Arturo Herrera Solis, MIBWC, to Commissioner John M. Bernal, USIBWC, regarding potential effects on Mexico's natural and physical environment;

English translation of May 22, 2000 letter from Commissioner J. Arturo Herrera Solis, MIBWC, to Commissioner John M. Bernal, USIBWC, regarding potential effects on Mexico's natural and physical environment; and

Letter of October 10, 2000 from Commissioner J. Arturo Herrera Solis, MIBWC, to Commissioner John M. Bernal, USIBWC, transmitting additional information regarding Mexico's natural environment and the shrimp harvest in the Sea of Cortez.

English translation of letter of October 10, 2000 from Commissioner J. Arturo Herrera Solis, MIBWC, to Commissioner John M. Bernal, USIBWC, transmitting additional information regarding Mexico's natural environment and the shrimp harvest in the Sea of Cortez.

Authority

Authority	United States Position
1. Article 10, 1944 Water Treaty	Mexico has a right to 1.5 million acre feet annually in scheduled deliveries. Mexico may receive an additional 200,000 af annually, but does not have right to system waters beyond the 1.5 maf.[1]
2. Resolution 1, Minute 242	Establishes quantity and salinity of waters delivered to Mexico at northern boundary and the southern boundary area.
3. Resolution 6, Minute 242	Provides that "With the objective of avoiding future problems, the United States and Mexico shall consult with each other prior to undertaking any new development of either the surface or the groundwater resources, or undertaking substantial modifications of present developments, in its own territory in the border area that might adversely affect the other country."

Assumptions

Assumption	United States Position
1. U.S. has right to make maximize its use of waters reserved under the 1944 Water Treaty, while recognizing Mexico's right to 1.5 maf annually under the 1944 Treaty.	Mexico's right to system waters is limited to the 1.5 maf annual amount and thus the U.S. obligation is ensure delivery of the 1.5 maf annually.
2. Use in the United States assumes the 15 maf Upper and Lower Basin compact allocation (Article III(a) and the lower basin right to increase its beneficial consumptive use by 1 maf (Article III(b))	Mexico should be allowed to schedule up to 200,000 af in addition to 1.5 maf, when storage in Lakes Powell and Mead are anticipated to exceed full conservation capacity.
3. U.S. surplus criteria seeks to maximize use of U.S. waters and avoid flood control releases.	The United States develop and supply technical data that identify impacts to future deliveries of up to 200,000 af of use in Mexico.
4. U.S. would not mitigate for impacts in Mexico, but would consider joint cooperation projects provided there is no net negative impact to the United States and that there is cost sharing based on benefits to each.	The United States should be prepared to identify a range of opportunities for joint cooperation projects with a benefit to the United States.

in excess of 1.5 maf. The decree in AZ v. CA allows the U.S. to release water in satisfaction of its obligations to the Mexican treaty without regard to the priorities listed in Article II(A). The Colorado River Basin Project Act describes that the satisfaction of the requirements of the Mexican Water Treaty shall be the first obligation of any water augmentation project planned. In the absence of such augmentation, the legislation states that the requirements of the Mexican Water Treaty, shall be from the waters of the Colorado River pursuant to the treaties, laws, and compacts until the augmentation of the water supply is available. This language seems to infer that the Mexico Treaty right to 1.5 maf is guaranteed and viewed as an obligation that the United States must meet each year prior to delivery of U.S. basic and surplus apportionments.

Ciudad Juárez, Chih., a 22 de mayo del 2000.

John M. Bernal,
Comisionado estadounidense,
Comisión Internacional de Limites y Aguas,
The Commons Building C., suite 310,
4171 North Mesa,
El Paso, Texas 79902-1422.

Estimado comisionado:

Me refiero a las reuniones binacionales realizadas en las ciudades de Henderson, Nevada y Mexico, D.F. el pasado 12 de abril y los dias 11 y 12 de mayo respectivamente, en las que la Oficina de Restauración de los Estados Unidos (USBR por sus siglas en inglés), presentó el criterio interino de excedentes en la cuenca del Rio Colorado, el cual considera modificar la operación del sistema hidráulico de esta cuenca para la distribución de dichos excedentes en la cuenca baja, y apoyar al Estado de California para se ajuste a su asignación en los próximos 15 años, tiempo que se prevé durará la implantación de dicho criterio.

En las condiciones de operación actuales, desde 1950 Mexico ha recibido en promedio un volumen aproximado de 2,530 millones de m3 anuales (2 millones de acres pies) producto de excedentes, los cuales tienen un uso benéfico en mi país evitando el deterioro ambiental del medio físico y natural, del entorno del Río Colorado.

El plan propuesto para la distribución de excedentes entre los Estados de Arizona, Nevada y California, ubicados en la cuenca baja, tiende a eliminar por 15 años estos flujos. Asimismo, dentro del Plan de California, se consideran medidas de conservación de agua, que afectarían la recarga de las aguas subterráneas que comparten ambos países, tal es el caso particular del revestimiento del Canal Todo Americano.

Se estima que la eliminación de estos flujos tendrían los siguientes efectos en el medio físico y natural mexicano:

...2

1. Afectación de la recarga del acuífero en cantidad y calidad reduciendo el uso benéfico del mismo.

2. Incremento en la salinización de las 200,000 hectáreas de cultivo del Valle de Mexicali, ya que parte de los excedentes son utilizados para el lavado de estos suelos.

3. Deterioro en la calidad del agua recibida por México en el Lindero Internacional Sur (LIS), sobre todo en lo que respecta a la salinidad, en virtud de que los flujos de agua fresca se utilizan para reducir las altas concentraciones de sal en este sitio.

4. Deterioro en la calidad del agua recibida por Mexico en el LIN, al reducirse el flujo al valor de la demanda mexicana, y mantener las descargas al río de flujos provenientes del drenaje agrícola del área de Yuma, Az.

5. En la parte alta del Mar de Cortés se afectarán especies en peligro de extinción o que requieren protección especial, tales como el cetáceo más raro y escaso del mundo, la Vaquita marina y la Totoaba. Además, se afectará la actividad pesquera comercial en la región, principalmte de camarón y dos especies de curvina, peces que no habían aparecido en números significativos en los últimos 25 años.

6. En cuanto a la flora existente en el tramo comprendido entre la Presa Morelos y la desembocadura del Río Colorado al Mar de Cortés, en los últimos años, se han restablecido cerca de 33,000 hectáreas de vegetación nativa ribereña, establecida en el cauce, conformada por álamos, sauces, mezquites y pino salado, entre otras especies que son fundamentales en el ecosistema, ya que muchas de éstas son utilizadas para la anidación de gran número de aves como el Palmoteador de Yuma, la Gaviota amarilla, la Golondrina de mar y la Garza real azul, entre otras, mismas que se verán afectadas por estas medidas.

...3

Cabe resaltar que los impactos indicados pueden debilitar las relaciones de cooperación bilateral referentes al Delta, que incluyen la coordinación entre las áreas naturales protegidas contiguas, el manejo ambiental de las cuencas y los acuerdos binacionales de protección de hábitats de humedales y especies migratorias en las que, ambos países son signatarios como la Convención de Ramsar, el Plan de Manejo de Aves Acuáticas de Norteamerica y la Red de Reservas de la UNESCO.

Finalmente, me permito hacer notar a usted que el gobierno mexicano no está de acuerdo en que el esquema propuesto, se lleve a la práctica sin considerar las medidas que se implementarían para mitigar su impacto en territorio mexicano. Asimismo, hago patente nuestra solicitud para que se considere al medio ambiente como un usuario de los excedentes que se declaren para la cuenca baja del Río Colorado. Apoyamos la buena disposición del Departamento del Interior de los Estados Unidos en proponer una "pérdida cero neta de beneficio ambiente" en la implantación del criterio de excedentes.

Aprovecho la oportunidad para reiterar a usted la seguridad de mi atenta y distinguida consideración.

ATENTAMENTE
(Signed)
J. ARTURO HERRERA SOLÍS
COMISIONADO MEXICANO

TRANSLATION
No.: LAE 01012/00
File: LAE/33
Ciudad Juárez, Chih.
May 22, 2000

JOHN M. BERNAL
United States Commissioner
International Boundary and Water Commission
The Commons Building C, Suite 310
4171 North Mesa
El Paso, Texas 79902-1422

Dear Commissioner:

I refer to the binational meetings carried out in Henderson, Nevada and Mexico City last April 12th and May 11th and 12th respectively, in which the United States Bureau of Reclamation (USBR) presented the interim surplus criteria for the Colorado River basin, which considers modifying the operation of the river system in this basin for the distribution of said surplus in the lower basin, and supports the state of California in adjusting its allocation in the next 15 years, the time period for the implementation of said criteria.

Under the current operating conditions, since 1950, Mexico has received an average volume of 2,530 Mm^3 annually (2 million acre-feet) of surplus water, which volume has been put to beneficial use in my country avoiding environmental deterioration of the physical and natural environment in the Colorado River.

The proposed plan for the distribution of surplus water between the states of Arizona, Nevada and California, located in the lower basin, tends to eliminate these flows for 15 years. Also, within the California Plan, water conservation measures are contemplated which will affect the recharge of the groundwaters shared by both countries, as is the case with the All-American Canal lining.

It is estimated that the elimination of these flows would have the following effects on the Mexican natural and physical environment:

1. Effects on the recharge of the aquifer both in quantity and quality, reducing the beneficial use of the same;

2. Increase in salinity in the 200,000 hectares of cultivation in the Mexicali Valley, since part of the surplus is used to leach this soil;

3. Deterioration in the quality of water delivered to Mexico at the Southerly International Boundary (SIB), especially in terms of salinity given that the flows of fresh water are used to reduce high concentrations of salinity at this site;

4. Deterioration in the quality of water received by Mexico at NIB in reducing the flow to the value of the Mexican demand and maintaining the discharges to the river from agricultural drains in the Yuma, Arizona area;

5. In the upper part of the Sea of Cortez, species in danger of extinction or which require special protection will be affected, such as the rarest and most scarce cetacean in the world, the sea cow and the Totoaba. Also, commercial fishing activities will be affected in the region, especially shrimping and two species of (*curvina*), fish which had not appeared in significant numbers in the last 25 years; and,

6. In terms of the existing flora in the reach between Morelos Dam and the mouth of the Colorado River at the Sea of Cortez, in recent years around 33,000 hectares of native riparian vegetation have been restored in the channel, mostly poplars, willows, mesquite and salt cedar, among other species which are fundamental in the ecosystem since many of these are used as nesting areas for a great number of birds, such as the Yuma Clapper Rail, the yellow seagull, the sea swallow and the royal blue swan, among others, same which would be affected by these measures.

It should be noted that the indicated impacts could weaken the bilateral cooperative relations regarding the delta, which include coordination between the contiguous protected natural areas, the environmental management of the basins and the binational agreements for protection of wetlands and migratory species in which both countries are signatory such as the Ramsar Convention, the Plan for the Management of North American Sea Birds, and the Network of Reserves of UNESCO.

Finally, let me bring to your attention that the government of Mexico is not in agreement with putting the proposed scheme into practice without considering the measures which would be implemented to mitigate its impact in Mexican territory. In the same light, I make known our request that the environment be considered a user of the surpluses which may be declared for the lower Colorado River basin. We support the goodwill of the Department of the Interior of the United States in proposing a zero net loss of benefit to the environment in the implementation of the surplus criteria.

I take this opportunity to reiterate to you the assurances of my most distinguished consideration.

Sincerely,
(Signed)
J. Arturo Herrera Solís
Mexican Commissioner

SECRETARIA DE RELACIONES EXTERIORES

Ciudad Juárez, Chih., a 10 de octubre de 2000.

John M. Bernal,
Comisionado estadounidense,
Comisión Internacional de Límites y Aguas,
The Commons Building C., suite 310,
4171 North Mesa,
El Paso, Texas 79902-1422.

Estimado Ing. Bernal:

Me refiero a mi oficio LAE 1012 del pasado 22 de mayo de 2000 con relación a los impactos identificados por México sobre el Criterio Interino de Excedentes del Río Colorado, que está desarrollando actualmente el Buro de Reclamación de los Estados Unidos, así como al Borrador de Manifiesto de Impacto Ambiental (DEIS) y a la reunión del 12 de mayo de 2000 en México D.F. en la cual el Buró de Reclamación presentó a México este Criterio.

Con relación al punto 3.16.3. titulado Consulta con México, del Borrador de Manifiesto de Impacto Ambiental, en donde se menciona "No está claro para el Buro de Reclamación de los Estados Unidos que la preocupación de México se deba al Criterio Interino de Excedentes, y que los temas que no emanen del mismo están fuera del ámbito de este reporte", comunico a usted que de acuerdo con el Manifiesto referido cualquiera de las alternativas propuestas alterarán en mayor o menor grado la frecuencia y magnitud de los flujos de avenidas que llegan a México, lo cual significa que la preocupación de México por el impacto adverso de este criterio en su territorio es real y por lo tanto debe considerarse como tal.

El Borrador de Manifiesto de Impacto Ambiental no profundiza en cuanto al hábitat y a la composición de las especies en México a lo largo del Río Colorado, sin embargo existe información documentada que confirma lo expuesto sobre el tema en el escrito de referencia. Ejemplo de esta información son los documentos: "A Delta Once More" Restoring Riparian and Wetland Habitat in the Colorado River Delta , Washington D.C. , Environmental Defense Fund. Publications de Daniel F. Luecke, entre otros.

En cuanto a la afectación de la actividad pesquera comercial en la región, la Universidad Autónoma de Baja California ha desarrollado un documento "Comentarios al Borrador de Impacto Ambiental del Criterio Interino de Excedentes del Río Colorado" (anexo), en el cual se hace un análisis del impacto de dicho criterio sobre la productividad pesquera. Asimismo, el estudio "Penaeid Shrimp Landings in the Upper Gulf of California in Relation to Colorado River Freshwater Discharge" de Manuel S. Galindo Bect y Edward P. Glenn, sugiere que el decremento de la descarga de agua del Río Colorado al Delta y estuarios puede afectar adversamente la producción de camarón (anexo).

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Finalmente, hago notar a usted que en la reunión de referencia se hizo énfasis en que la identificación de los impactos físicos y ambientales en mi país se haría de forma cualitativa, en virtud de los tiempos tan reducidos para la presentación de comentarios, y por lo tanto no hubo la oportunidad para emitir una respuesta en la cual se incluyeran estudios específicos sobre los impactos en mi país por la aplicación del citado criterio, por lo que en tal sentido, le solicito considerar las preocupaciones expuestas por México vinculadas directamente con la implementación del Criterio Interino de Excedentes.

Aprovecho la oportunidad para reiterar a usted la seguridad de mi atenta y distinguida consideración.

ATENTAMENTE

J. ARTURO HERRERA SOLÍS,
COMISIONADO MEXICANO.

RAUL ZUÑIGA CASTILLO[2]; BERNARDO PRIMITIVO FLORES BAEZ[1], JOSE ANTONIO SEGOVIA ZAVALA[1]
[1] INSTITUTO DE INVESTIGACIONES OCEANOLOGICAS, UABC
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KM. 107 CARRETERA TIJUANA ENSENADA

RESUMEN

La Universidad Autónoma de Baja California (UABC) está en desacuerdo con las cuatro alternativas propuestas por DEIS ya que considera que la única alternativa posible para lograr que no exista pérdida neta de los beneficios al ambiente, es la NO ACCION o condición de línea base. No estamos de acuerdo con los datos proporcionados en la notación 75R en la cual se indica que los flujos históricos naturales que llegan al punto Lee Ferry son menores que el valor de 18.1 millones de acre pie. Esto se muestra en la Figura 1, en la cual se presenta el comportamiento del flujo del río desde principios del siglo a la fecha. El valor promedio (18.1) que obtienen de 75% de flujos históricos anuales está probablemente considerando los flujos después de la creación de las presas Hoover y Glenn Canyon, construidas en 1935 y 1960 respectivamente. Esta última presa estuvo reteniendo el agua del río por aproximadamente 20 años (1960-1980), por lo que cualquier valor promedio que se obtenga no reflejará la condición de no acción actual. También se nota claramente que posterior al llenado de la presa Glenn Canyon en 1980, el volumen de agua manejado como excedente y que fue enviado a México alcanzó valores de flujo similares a los del río sin la presencia de presas, este fenómeno extraordinario se debió a deshielos no previstos en las Montañas Rocallosas y ocasionó que el flujo del río no pudiera controlarse en los Estados Unidos de América (EUA).

El concepto de ecosistema para el enfoque del funcionamiento de toda la cuenca del Río Colorado, en donde el agua es un servicio ambiental interactuante con el estado de la salud de la cuenca en su conjunto, no fue considerado cuando se firmó el Tratado de 1944, tampoco se toma en cuenta en la actualidad, cuando se constata que no se considera la cuenca baja en México y su zona de influencia el

considerando entre los más importantes las cuencas hidrográficas y sus zonas de influencia marina, como se menciona en el Programa de Acción Mundial (PAM). Ambos países deben considerar en el manejo del Río Colorado a la cuenca baja del Río Colorado, el Delta y el Golfo de California en México, como parte del ecosistema y que no debe ser afectada. Los efectos ambientales, y sobretodo de los impactos al desarrollo de la región del Delta y el Alto Golfo, se han documentado en la Figura 2, donde se analizan las capturas de camarón (principal actividad de la región) y su relación con los flujos de agua dulce del Río Colorado. Como se ve claramente, hay una relación directamente proporcional entre flujos y capturas. De tomarse cualquier alternativa de uso de los "EXCEDENTES", el desarrollo económico y social de esta porción del país, se verá seriamente afectada.

Los impactos económicos son tan importantes como los de conservación y restauración que se han manejado por otras instancias.

INTRODUCCION

El control del flujo del Río Colorado mediante la construcción de presas en los EUA y México, han dado lugar a numerosas manifestaciones de protestas por grupos no gubernamentales de ambos países y a prolongadas negociaciones para determinar la cantidad y calidad del agua que se debe enviar a México. El manejo del río en presas de los EUA y la utilización del agua otorgada a México a través del Tratado Internacional de 1944 para actividades urbanas y agrícolas, ha conducido a un cambio en el funcionamiento ecológico de la cuenca baja del Río Colorado, considerando como parte de la cuenca a la Reserva de la Biosfera Alto Golfo de California y Delta del Río Colorado.

La variabilidad del flujo del río al océano es un aspecto que ha recibido muy poca atención por parte de ambos países, la alteración ecológica del estuario como área de crianza de muchas especies comercialmente importantes debe representar uno de los aspectos más relevantes en el control del flujo

y estacionalidad de los mismos. La alteración de uno o más de los aspectos señalados, debe tener repercusiones ecológicas notables que se manifiestan en las primeras etapas de desarrollo de las especies comercialmente importantes y que en una etapa de su desarrollo son estuarino-dependientes como el camarón, la curvina y la totoaba, ésta última actualmente en peligro de extinción; en segundo término, en la reducción de la producción pesquera de la región que finalmente repercute en las comunidades pesqueras que viven de estos recursos como lo mencionan Greenberg y Vélez-Ibáñez, (1994); Mcguire y Greenberg, (1994)

IMPORTANCIA ECOLOGICA

El Delta del Río Colorado alrededor de las Islas Montague y Pelícano, representa un hábitat de gran importancia para especies marinas que en una etapa temprana de su desarrollo, buscan alimento, refugio y condiciones hidrológicas óptimas (estuarinas) para su desarrollo. Esta área es considerada como zona de reproducción, desove y crianza de especies que posteriormente serán reclutadas al soporte de las pesquerías de la región (Cabtree, 1989).

Considerando la importancia ecológica y con el propósito de proteger las especies que temporal o permanentemente habitan esta región, el Gobierno Mexicano ha realizado tres iniciativas de decreto. La primera en 1955 donde declara esta región como zona de refugio de fauna marina; la segunda en 1974 la establece como zona de reserva, cultivo y/o repoblación; la tercera emitida el 10 de junio de 1993 la decreta como "Reserva de la Biosfera Alto Golfo de California y el Delta del Río Colorado" (Diario Oficial, 1993; Morales-Abril, 1994). El objetivo primordial de este último decreto es garantizar la protección de los valores biológicos y ecológicos que permita el aprovechamiento racional y sustentable de los recursos naturales.

fue de 20.7 X 10^9 M^3.$año^{-1}$ (Fradking 1981). Después de nueve años de la construcción de la presa Hoover y dentro de la legislación en el uso de las aguas del Río Colorado, el 3 de febrero de 1944 se firmó el Tratado de Aguas con Estados Unidos por el cual se asignó a México un volumen de agua anual no menor de 1.85 x 10^9 m^3.$año^{-1}$, correspondiendo aproximadamente al 10% del flujo anual promedio del río. En la asignación de la cuota anual de agua a Méxiço no se consideró el impacto ecológico por la restricción del agua dulce al ecosistema.

IMPACTO POR LA RESTRICCION DEL RIO COLORADO

Sykes (1937), describió cambios en la hidrología estuarina asociada a la construcción de la presa Hoover en los E.U.A. Estos cambios incluyen, pérdida de humedales y hábitat de aguas someras; incremento en la erosión por la acción de mareas; desaparición de canales; cambios en la vegetación y una declinación en la abundancia de peces, pájaros y mamíferos.

Glenn *et al* (1995), mencionan que la biodiversidad y la vitalidad de los humedales han sido afectados, de tal forma que de 1973 a 1993, el área de marismas de agua dulce y salobre varió entre 5,800 y 63,000 ha. Sin embargo a partir de 1977, aportes significativos de agua ligeramente salobres (2 a 3 ups) conducidas por el canal Welton Mohawk, recuperaron ligeramente los últimos cenagales remanentes del Río Colorado (Glenn *et at.* , 1992). Mellink *et al.* (1997) resaltan la importancia de estos humedales perdidos para aves acuáticas, las cuales actualmente están utilizando principalmente extensas planicies lodosas en la boca del delta.

Alvarez-Borrego *et al* (1975) y Hernández-Ayón *et al* (1993) mencionan que el Alto Golfo de California y el Delta del Río Colorado han perdido en gran medida sus condiciones estuarinas, excepto en algunos inviernos caracterizados por alta precipitación pluvial e incremento del flujo del río por excedentes en las presas.

económicas importantes en una reducción de la producción pesquera de la región del Alto Golfo de California.

Entre los impactos importantes por el manejo del río se encuentra el camarón azul *Litopenaeus stylirostris*, que de acuerdo a la parte de su ciclo de vida como organismo estuarino dependiente, las postlarvas suben al estuario en busca de alimento, protección y condiciones óptimas para su desarrollo. El Alto Golfo de California a pesar de la ausencia del flujo del río, es un área que está caracterizada por ser rica en nutrientes inorgánicos y altamente productiva (Hernández Ayón *et al.*, 1993). Sin embargo, el impacto ecológico para esta especie en particular no es un problema de osmoregulación sino la pérdida de una barrera física de salinidad que brinda protección evitando la predación por la introducción de especies exóticas al área. Así también, cambios en la dinámica hidrológica del Alto Golfo disminuyendo la intensidad de la corriente residual perpendicular a la costa la cual es de vital importancia para el transporte de larvas desde el océano hacia la costa.

Carbajal *et al.*, (1997), diseñaron un modelo tridimensional, no lineal, para establecer el comportamiento teórico de la hidrodinámica del estuario antes de la construcción de las presas y el impacto físico por la reducción de la descarga del río al mar. Muestran que la barrera salina donde actualmente se encuentra la isohalina de los 37, requiere de un flujo del río de 2000 $m^3.seg^{-1}$, para reducir a una salinidad de 15. Mediante este modelo se podrá determinar la dimensión mínima del estuario de acuerdo los requerimientos para la restauración ecológica.

ANALISIS DE LA PESQUERIA DE CAMARON EN EL ALTO GOLFO DE CALIFORNIA

La pesquería del camarón representa la principal fuente de ingresos económicos de las comunidades del Alto Golfo de California. Galindo-Bect *et al.*, (2000) al analizar el comportamiento

este crustáceo responde a impulsos físicos estimulados por la presencia o ausencia de agua dulce al área de crianza.

En 1980, cuando el flujo de agua del Río Colorado recibido en México fue de 17.5 x 10^9 $m^3.año^{-1}$, flujo comparable al río sin presas, las capturas comerciales de camarón fueron las mayores en la historia de esta pesquería (Fig. 2). Así también se observa que existe una respuesta biológica ante un impulso físico, mayores capturas de camarón con relación a la precipitación pluvial en la región (Fig.3) y aunado a los excedentes del río en esos períodos. Por esta razón consideramos que la diferencia entre la máxima captura de camarón registrada en 1980, con respecto a cualquier otra captura anual registrada en la historia de esta pesquería, es el impacto producido por el manejo del agua del Río Colorado.

CONCLUSION

1.- Se debe reconocer que la Cuenca Baja del Río Colorado no termina en la frontera con los EUA y que la Reserva de la Biosfera Alto Golfo de California y Delta del Río Colorado forma parte de la misma.

2.- Que el manejo del agua del río en ambos países ha estado alterando el funcionamiento ecológico de la Cuenca Baja del Río Colorado.

3.- En desacuerdo con la propuesta de los EUA para la distribución de los llamados "EXCEDENTES" del Río Colorado, ya que va a ocasionar mayor deterioro ecológico, económico y social en la cuenca baja y el Alto Golfo correspondiente al lado mexicano.

4.- El deterioro ecológico mencionado ha creado una crisis social y económica de las poblaciones ribereñas que viven de los recursos bióticos y abióticos impactados y que además el problema se agravará en caso de aprobarse la propuesta de los EUA para la utilización de los "EXCEDENTES".

se impactarán los ecosistemas frágiles del alto Golfo.

6.- Respeto a las normas internacionales para el manejo del agua de los ríos cuando éste pasa por dos o más países.

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Colorado River freshwater discharge

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David Moore[2]

A commercial trawl fishery in the upper Gulf of California provides the principle source of income for the coastal communities of the region, but catches of estuarine-dependent crustaceans and fish have declined in recent years (Hernan, 1997; Cudney-Bueno and Turk-Boyer, 1998). Declines in shrimp landings, mainly *Litopenaeus stylirostris* (formerly classified as *Penaeus stylirostris*) (Pérez-Farfante and Kinsley, 1997) have been attributed primarily to over-exploitation of the resource and to viral diseases (Rosas-Cota et al., 1996; Hernan, 1997).

The Biosphere Reserve of the upper Gulf of California and Colorado River Delta was created in 1993 to address some fisheries management problems. A more fundamental problem, however, may be the lack of river flow after construction of upstream dams. Historic reductions in river discharge have caused dramatic increases in salinity in the estuary and changes in the distribution of nutrients (Alvarez-Borrego et al., 1975; Hernandez-Ayon et al., 1993). Since 1979, occasional flood releases have entered the upper Gulf of California by means of the Colorado River when upstream impoundments are filled (Glenn et al., 1996).

Effects of freshwater on penaeid shrimp population development are controversial (Garcia and Le Reste, 1981; Day et al., 1989), but recruitment of spawning stocks of white shrimp (*Penaeus setiferus*) has been positively correlated with river discharge in the southwestern Gulf of Mexico and has been attributed to an expansion in estuarine nursery habitat for white shrimp (Garcia, 1991). River discharge also can stimulate the migration of subadults from estuaries (Deben et al., 1990; Vance et al., 1998). Fishery-independent data from the Colorado River (Cudney-Bueno and Turk-Boyer, 1998). To evaluate their perception we conducted a correlation analysis of shrimp landings at San Felipe Baja California (nearest shrimping station to the delta) with freshwater discharges from the Colorado River to the northern Gulf of California.

Materials and methods

Data on annual shrimp landings and number of trawlers legally fishing from San Felipe were obtained from the Secretary of Environment, Natural Resources and Fish (SEMARNAP), San Felipe, Mexico. Landings were available from 1977 and number of trawlers from 1982. The artisanal catches by small boats (pangas) or the significant illegal shrimp fishery are not accounted for in reported shrimp landings. Annual shrimp landings serve as indicators of the variability in the total landings and are reported for all species of shrimp, even though landings are >90% *L. stylirostris* in San Felipe (Rosas-Cota et al., 1996). Data on freshwater discharge of the Colorado River were from the Southerly International Border (S.I.B.) gauging station which is below the last diversion on the river and were obtained from the United States

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Fish. Bull. 98:222–225 (2000).

divided by numbers of trawlers (normal catch per unit of effort, CPUE) were correlated with river flow and number of trawlers. Our normal CPUE was a crude approximation of stock abundance or catchability. We lacked actual fishing time (days, weeks, hours of net deployment), size frequency of the legal vessels, and number of small boats (pangas) fishing. We made landings lag river discharge by one year because the life cycle of shrimp from hatching to capture is approximately one year (Gracia-Pamanes[2]). Transformed river flow ($\log_{10}$) was tested for nonlinearity; then we conducted a multiple regression analysis to predict shrimp landings from variables that were individually correlated ($P<0.05$) with landings.

Results

Annual shrimp landings ranged from 701 metric tons (t) (1983–84) to 217 t (1992–93), decreasing significantly from 1977 to 1996 ($r=0.78$, $P<0.001$, Fig. 1A). The reported number of trawlers legally fishing from San Felipe ranged from a high of 59 in 1988 to a low of 20 in 1995 (Fig. 1B). Catch per unit of effort (CPUE) increased from 1982 to 1984, then markedly decreased back to the 1982–83 level in 1985, remaining low until 1993, after which a positive trend was achieved and the highest CPUE ever was recorded in 1995 (Fig. 1C). There were substantial flows (>100 million cubic meters, Mm^3) in 8 of the 21 years from 1976 to1996 and varied over 10^4-fold, ranging from 1 Mm^3 in 1990 and 1996 to 15,657 Mm^3 in 1984 (Fig. 1D). Highest volume occurred between 1980 and 1987 as a result of overflow from Lake Powell in the United States (Glenn et al., 1996). The flow spike in 1993 was due to releases from Painted Rock Dam on the Gila River in Arizona. Periods of significant river flow at the S.I.B. were closely matched to El Nino Southern Oscillation (ENSO) events that occurred in 1983 and 1993.

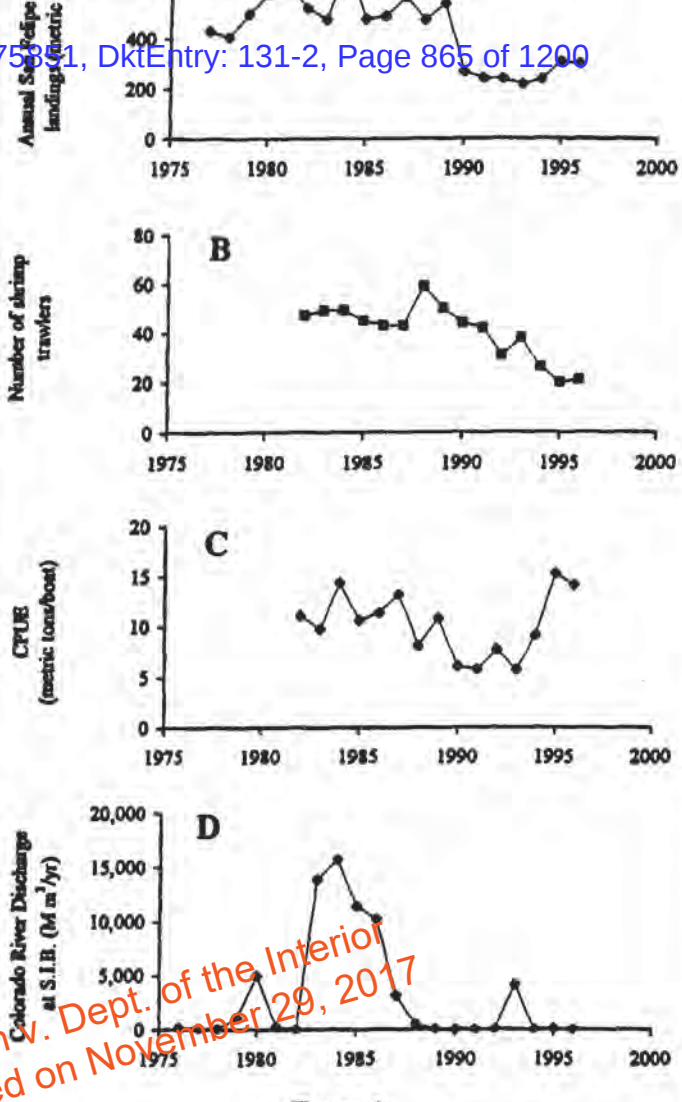

Figure 1

(A) Annual San Felipe shrimp landings (metric tons); (B) Number of shrimp trawlers fishing annually in San Felipe; (C) CPUE (metric tons/boat); (D) Colorado River freshwater discharge flow below the Southerly International Border (million m^3/yr).

Shrimp landings were significantly ($P<0.05$) correlated with same year river discharge, but $\log_{10}$-transformed river discharge in the year prior to shrimp harvest produced the highest correlation coefficient ($r=0.67$, $P<0.001$) (Table 1). The number of trawlers also significantly correlated with shrimp landings ($r=0.77$, $P<0.001$), as expected. The best correlation (r) of shrimp landings was the product

[1] Williams, B. 1998. United States Bureau of Reclamation, Yuma, Arizona. Personal commun.

[2] Garcia-Pamanes, F. C. 1992. Biologia reproductiva y dinamica poblacional del camaron azul Penaeus stylirostris en el Alto Golfo de California. Instituto de Investigaciones Oceanologicas, Universidad Autonoma de Baja California, Ensenada. Unpubl. final report.

(1977–96) and CPUE (1982–96) to rainfall and discharge of the Colorado River at the Southern International Border. A "1-year lag" indicates that shrimp landings were paired with the previous year's river discharge in the correlation analysis.

Variable	Correlation with shrimp landings		Correlation with CPUE	
	r	*P*	*r*	*P*
River discharge	0.47	0.0362	0.25	0.3360
Log_{10} river discharge	0.54	0.0112	0.25	0.3368
River discharge (1-yr lag)	0.52	0.0127	0.34	0.1826
Log_{10} of river discharge (1-yr lag)	0.67	0.0006	0.38	0.1304
Number of shrimp trawlers	0.77	0.0003	0.18	0.4804
Log_{10} of river discharge (1-yr lag) × number of shrimp trawlers	0.80	0.0004	0.29	0.8771

of log_{10}-lagged river discharge and number of trawlers (r=0.80, P<0.001). CPUE was not significantly (P>0.05) correlated with river flow or number of trawlers (Table 1), nor with total landings (r=–0.26, P=0.31). The equation of best fit (0.64) for predicting shrimp landings took the form

$$Y = a + m(X_1X_2),$$

where X_1 = log_{10}-lagged river discharge (Mm^3/yr);
X_2 = number of trawlers;
Y = shrimp landings (t/yr);
M = the slope of the equation (1.67); and
a = the Y-intercept (232 t/yr).

Discussion

Our analyses represent a first attempt to identify relationships between variability in shrimp landings in the upper Gulf of California and factors influencing these landings. Total shrimp landings and the size of the shrimping fleet at San Felipe have declined over the past 15 years. Social and economic changes have affected shrimping. In the late 70s and early 80s shrimping was reserved for social units (cooperatives), with the result that privately owned shrimp trawlers were banned from the fishery. In addition, the government subsidized building of additional vessels and many new unskilled fishermen entered the industry. Then policies were reversed in the late 1980s, private boats returned, interest rates increased, and many of the shrimp trawlers were removed from the fleet.

We found a significant relationship (P<0.001) between total catch and the rate of freshwater discharge of Colorado River water into the marine ecosystem, although the mechanisms through which river discharge might affect the shrimp fishery are unknown. Lower salinity may improve the survival of early life stages by providing "enlarged nursery" protected habitat (Garcia, 1991), even though *L. stylirostris* and *P. californiensis* are generally considered euryhaline species (Hernan, 1997), having large numbers of postlarvae and juveniles in hypersaline habitats (Brusca, 1980; Page[3]). Salinity and nutrient gradients in the estuary and upper Gulf during river flows have not been reported to our knowledge.

Future plans for the Colorado River will likely decrease freshwater discharge into the estuary as more water is diverted upstream for farms and domestic use (Morrison et al., 1996). Our analyses suggest that decreases in river discharge to the delta and estuary may adversely affect shrimp landings. The United States and Mexican governments should initiate a research program on the effects of river flow on ecologically and commercially important species in the upper Gulf of California and incorporate these findings into a comprehensive management plan for the Biosphere Reserve as well as the Colorado River Basin at large.

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(SEAL Secretariat of
Foreign Relations)

TRANSLATION
No.: LAE 01859/00
File: LAE/33
Ciudad Juárez, Chih.
October 10, 2000

Eng. John M. Bernal
United States Commissioner
United States Section
International Boundary and Water Commission
The Commons Building C, Suite 310
4171 North Mesa
El Paso, Texas 79902-1422

Dear Engineer Bernal:

I refer to my letter No. LAE 1012 of May 22, 2000 concerning the impacts identified by Mexico in the context of the Colorado River Interim Surplus Criteria which is presently being developed by the United States Bureau of Reclamation (USBR). I also refer to the draft environmental impact statement and the meeting of May 12, 2000 in Mexico City, the latter in which the USBR presented this criteria concerning point 3.16.3 of the Draft Environmental Impact Statement (DEIS) "Consultations with Mexico". It mentions that " it is not clear to the USBR whether the concern of Mexico is due to the Interim Surplus Criteria and that the issues outlined in this concern are outside the scope of this report." Concerning this I inform you that in accordance with the report in reference any of the alternatives proposed will alter to a large or small degree the frequency and the magnitude of the flood flows that arrive in Mexico. This indicates that the concern of Mexico of the adverse impact of this criteria in Mexico is a real one and therefore should be considered as a serious one.

The Draft Environmental Impact Statement does not cover in detail the habitat and the composition of species in Mexico along the Colorado River. Nevertheless, there is documented information on this information as shown in the referenced paper, an example of this information are the documents "A Delta Once More"Restoring Riparian and Wetland Habitat in the Colorado River Delta, Washington, D.C., Environmental Defense Fund. Publications by Daniel F. Luecke, and others.

Concerning the impact on the commercial fisheries in the region, the Autonomous University of Baja California has developed a document entitled, "Comments on the Draft Environmental Impact Statement on the Interim Surplus Criteria, Colorado River" (enclosed), which provides an analysis of the impact of such criteria on the fishing productivity. At the same time, the study "Penaeid

Shrimp Landings in the Upper Gulf of California in Relation to Colorado River Freshwater Discharge," by Manuel S. Galindo Bect and Edward P. Glenn, suggests that the decrease in the discharge of Colorado River water to the Delta and its estuaries could adversely affect the production of shrimp (enclosed).

Finally, I make note of the referenced meeting in which there was emphasized that the identification of the physical and environmental impacts in my country would be made in a qualitative manner. This was in view of the short time frames provided for the presentation of comments. For this matter there was not sufficient opportunity to provide a response that would include specific studies on impacts in my country that would resulting from the Interim Criteria therefore in this manner I request that you consider the concerns expressed by Mexico that are directly linked to the implementation of the Interim Surplus Criteria.

I take this opportunity to reiterate the assurances of my most courteous and distinguished consideration.

Sincerely,
(Signed)
J. Arturo Herrera Solís
Mexican Commissioner

COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT DRAFT OF THE INTERIM SURPLUS CRITERIA

Manuel Salvador Galindo Bect [1]; Martha Ileana Espejel Carbajal [2]; Walter Raul Zuñiga Castillo [2]; Bernardo Primitivo Flores Baez [1]; José Antonio Segovia Zavala [1]
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SUMMARY

The Autonomous University of Baja California, (UABC), disagrees with the four alternatives proposed in the DEIS as it considers that the only possible alternative, that would arrive at a no net loss to the environmental benefits, would be the no action alternatives or, that is, the baseline condition. We do not agree with the data provided in the notation 75R which indicates that the natural historic flows that arrive at Lee Ferry are less than 18.1 maf. This is shown in figure 1, which shows the flow regimens since the beginning of this century. The average value (18.1) obtained by the 75% of historical annual flows is probably considering the flows after the creation of Hoover and Glenn Canyon dams, constructed in 1935 and 1960, respectively. This last dam has stored river water for approximately 20 years (1960-1980), thus the average value obtained does not reflect the condition of no action at this time. We also note clearly that prior to the filling of Glenn Canyon Dam in 1980, the water volume considered as surplus and which was delivered to Mexico had a flow value similar to the river without the presence of the two dams. This extraordinary phenomenon was due to the unforeseen snow melt in the Rocky Mountains and resulted in a flow that could not be controlled in the United States.

The concept of an ecosystem that focuses on the overall management of the Colorado River basin, in which water also serves an interactive role in the basin health in totality, was not considered with the signing of the Treaty of 1944. This situation is also not covered in the current period. This is because the Lower Basin in Mexico is not considered, nor are these zone of influences in the Delta of the Colorado River and the Gulf of Mexico as a part of the ecosystem. Nevertheless, at the global level the governments have been presenting their preoccupation concerning the ecological equilibrium of ecosystem considering that the more important parts of the hydrologic basins and their influence in the marine zones are part of the world action program (PAM). Both countries should consider the Lower Basin of the Colorado River, the Delta and the Gulf of California in Mexico, in the management of the Colorado River as part of the ecosystem, and thus, the latter should not be affected.

The environmental impacts, and overall the impacts to the development of the Delta and the Upper

Gulf Region, are documented in Figure No. 2, in which the shrimp landing (the principal region activity) are analyzed, and its relations to the flows of the sweet waters of the Colorado river. One can see clearly that there is a direct proportional relation between the flows and the landings. Should any alternative for the Surplus Criteria be adopted, the economic and social development, of this part of the country, would be very seriously affected.

The economic impacts are as important as the conservation and preservation which have been dealt with in other cases.

INTRODUCTION

The control of the flow of the Colorado River through the dams in the U. S. and Mexico have provided the number of protests by non-government groups presented to both countries and have led to prolonged negotiation to determine the quantity and quality of the water that should be delivered to Mexico. The management of the river in U. S. dams and the utilization of water provided to Mexico through the 1944 Water Treaty for urban and agricultural activities has brought about a change in the ecological functioning of the Lower Basin of the Colorado River. This is especially when one considers the Upper Gulf of California Biosphere Reserve and the Colorado River Delta.

The flow variability in the river to the ocean is an aspect that has received very little attention on the part of both countries. The ecological alteration of the estuary as an area for breeding of many commercial species of great importance should represent one of the most relevant aspects in the control and management of the river flow. The flow of the sweet water to the ocean plays an important role in the equilibrium and productivity of the environmental estuaries not only because of the quantity of the flows but also because of the quality and seasonality of the same period. The alteration of one or more of the aspects pointed out should have ecological repercussions that are significant and are manifested in the first stages of development of the important commercial species. Also important, is that during a stage of their development these are esturine-dependant, including species such as shrimp, corvina and the totoaba. The latter is actually in danger of extinction. Secondly, reducing fish production in the region would, in the end, adversely affect the fishery communities that live with these teadurces as mentioned by Greenberg and Vélez Ibañez, (1994) and Mcquire and Greenberg, (1994).

ENVIRONMENTAL IMPORTANCE

The Delta of the Colorado River along the Montague and Pelícano Islands, represents a habitat of great importance to the marine species specially in the early stages of their development. This is a stage in which they seek food, refuge, and optimum hydrological conditions (esturine) for their development. This area is considered as a reproduction area, which for the development and breeding of species, will later be brought in in support of the fisheries of the region (Cabtree, 1989).

Considering the ecological importance and the proposal to protect the species that are temporarily or permanently inhabiting the region, the Government of Mexico has carried out three initiatives by means of decree. The first was in 1955 when the area was declared a marine wildlife refuge region. The second was in 1974 when the area was declared a reserve for cultivation and reproduction. The third was issued on June 10, 1993 as the "Upper California and Colorado River Delta Biosphere Reserve" (Official Daily, 1993; Morales-Abril, 1994). The primary objective of this last decree is to guarantee the protection of the biological and ecological values that allow the rational and sustainable utilization of the natural resources.

FLOW OF THE COLORADO RIVER BEFORE AND AFTER THE CONSTRUCTION OF THE DAMS

The average flow of the Colorado River before the construction of the dams in the United States was 20,700 mcm/year (Fradking, 1981). After nine years, the construction of Hoover Dam and within the legislation for use of the waters of the Colorado River, the U. S. - Mexico water Treaty of February 3, 1944 was signed. This Treaty provided to Mexico an annual volume of 1,850 mcm annually or approximately 10% of the annual flow of the river. The allotment of the annual amount of water to Mexico did not consider the environmental impact of reducing the amount of fresh water in the ecosystem.

IMPACT DUE TO RESTRICTION OF THE COLORADO RIVER

Sykes (1937), described changes in the esturine hydrology associated with the construction of Hoover Dam in the U.S. These changes included the loss of wet lands and habitat in the submerged areas and increased the erosion due to tidal action. There was also the loss of drainage, changes in vegetation and a decline in the abundance of fish, birds, and mammals.

Glenn *et al* (1995), mentioned that the biodiversity and the vitality of the wetlands have been affected, such that from 1973-1983, the fresh water and salt water mixing zones varied between 5,800 to 63,000 hectares. Nevertheless, since 1977, significant contributions of highly saline waters (2 to 3 ups) conveyed by the Welton-Mohawk quickly recuperated the last of the remaining marshes in the Colorado River (Glenn *et al*, 1992). Melink *et al* (1997) pointed out to the importance of the lost wetlands available for aquatic birds which currently use the extensive fenns in the mouth of the Delta.

Alvarez-Borrego *et al* (1975) and Hernández-Ayón *et al* (19)3) mention that the Upper California and the Upper Colorado River Delta have lostto a large extent their esturine characteristics, except in some winter time conditions characterized by rainfall and increased by flows by the river due to excess flows from the reservoirs.

The freshwater inflow has a key role in the equilibrium productivity in the estuary environment. Not

solely because of quantity, but also because of quality and the variability of the flows. The alteration of one or more of the aspects above, could have social and economic repercussions that would be reflected in the reduction of fisheries production in the upper Gulf of California region.

Among the important aspects in the management of the river are the blue shrimp, *Litopanaeus stylirostris*, whose post larvae migrate upwards to estuary seeking food, protection, and optimal conditions for their development. This is in accordance with the life cycle of the esturine dependant organism. The Upper California Gulf, even with its lack of river flows, is an area which is characterized as rich in inorganic nutrients and is highly productive (Hernández Ayón *et al*,1993). However, the ecological impact, to this species in particular, is not a problem of osmoregulation but rather the loss of a physical salinity barrier which provides protection and therefore avoids this specie being victim by the introduction of predatory species in the area. Also, the changes in the dynamic hydrology of the Upper Gulf decreases in intensity with a residual flow being perpendicular to the coast which is something that is vitally important for the transport of larvae to the coast.

Carbajal *et al* (1997), designed a tri-dimensional model, not a linear one, to establish the theoretical behavior of the hydrodynamics of the estuary before the construction of the dams and the physical impact of the reduction of the flow to the sea. The model shows that the saline barrier located in the isohaline at 37 requires a flow of 2,000 cms in order to reduce the salinity to 15. Based on this model one could determine the minimum dimension of the estuary in accordance to the requirements for its ecological restoration.

ANALYSIS OF THE SHRIMP LANDS IN THE UPPER GULF OF CALIFORNIA

The shrimp fisheries represent an important source of economic revenues for communities in the Upper California. Galindo-Bect *et. al.* (2000). In their analysis of the historical behavior of the fisheries, their study shows that the landings from San Felipe have been very irregular with increases and decreases related to the variable flow of the Colorado River. It is clear that this crustaceous response to physical impulses stimulated by the presence or absence of fresh water in the breeding area.

In 1980, when the flow of the Colorado River received by Mexico was at some 17,500 cm per year, a flow comparable to the river before the dams, the commercial fishery captures were the greatest in history of the industry (Figure 2). This also shows the observation that there is a biological response brought about by a physical influence, that is, greater landing of fish in relation to rainfall in the region (Figure 3), and added to this the existence of surplus flows of the river during these periods. For this reason, we consider that the difference between the maximum shrimp landings in 1980 with respect to any other landings registered in history. The impact is brought about by the management of the waters of the Colorado River.

CONCLUSION

1. It should be recognized that the Lower Basin of the Colorado River does not end at the boundary with the U. S. and that the Upper Gulf of California and the Colorado River Delta Biosphere Reserve form part of the basin.

2. That the management of the river water in both countries is altering the ecological operations of the Lower Basin of the Colorado River.

3. There is disagreement with the proposal by the U. S. to distribute the surplus flows of the Colorado River, as these will cost greater ecological deterioration as well as economic and social damage in the Lower Basin and the Upper Gulf in Mexico.

4. The ecological deterioration mentioned has created a social and economic crisis in the riparian communities that depend on the biotic and antibiotic resources impacted and that the problem would be more aggravated if the proposal by the U. S. for the use of surplus waters is approved.

5. *[sic]* A allocation of water specifically dedicated to ecological restoration should be considered.

5. *[sic]* There is objection to the proposal of the U. S. to line the All American Canal because this will impact the groundwaters in Mexico.

6. [*sic]* There should be a respect to the international standards for the management of river waters when this river passes through one or more countries.

LITERATURE CITED

(Refer to original)

Colorado River Interim Surplus Criteria

Final Environmental Impact Statement

Volume III Comments and Responses

U.S. Department of the Interior
Bureau of Reclamation
December 2000

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Oral Comments

[1]This letter was submitted by the following organizations:

Defenders of Wildlife
Environmental Defense
El Centro de Derecho Ambiental e Integracion Economica del Sur, A.C.
Friends of Arizona Rivers
Glen Canyon Action Network
Glen Canyon Institute
Pacific Institute for Studies in Development, Environment and Security
Sierra Club
Fred Cagle
Jaqueline Garcia-Hernandez

INTRODUCTION TO VOLUME III

Reclamation, acting on behalf of the Secretary, published a Notice of Availability of a DEIS for Colorado River Interim Surplus Criteria, and a schedule of public hearings in the *Federal Register* on July 7, 2000 (Vol.65, No. 131). Additionally, Reclamation published a Notice of Public Availability of Information on the DEIS on August 8, 2000, in the *Federal Register* (Vol. 65, No. 153) for public review and comment. Over 400 copies of the DEIS were distributed to interested federal, Tribal, state, and local entities and members of the general public for review, and the document was also available for public viewing on Reclamation's Lower Colorado Region website.

Public hearings were held to receive oral comments on the DEIS during the month of August 2000. In addition to oral comments made at these hearings, Reclamation received 68 letters with comments pertaining to the DEIS. Reclamation has reviewed all comments received during the Colorado River Interim Surplus Criteria DEIS public comment period.

As a result of Reclamation's review of comments pertaining to the DEIS, and pursuant to the requirements of the NEPA, Reclamation has prepared this FEIS. Volumes I and II of the FEIS contain the revised text of the EIS and the attachments, respectively. Volume III, this volume, contains two parts: Part A discusses oral comments received at public hearings held for the DEIS, and Part B contains copies of comment letters received by Reclamation, accompanied by Reclamation's specific responses to individual issues raised in each letter.

Reclamation received a significant number of comments regarding the purpose and need for this action (development and adoption of interim surplus criteria), and related and ongoing activities. In particular, questions were asked with regard to the relationship of interim surplus criteria to California's efforts to reduce its over reliance on Colorado River water. Reclamation believes that, in addition to the individual responses provided in Part B of this volume, it is appropriate to provide the following general response to these questions.

General Response Pertaining to the Purpose and Need of Interim Surplus Criteria

Reclamation determined in 1999 that there was a need for development of specific surplus criteria (see *Federal Register* Vol. 64, No. 27008 (May 18, 1999) in Chapter 5 of Volume I). Recent experience in preparing the AOPs for the Colorado River Reservoirs has demonstrated the difficulty in making surplus determinations without specific criteria. In addition, the most recent five-year review of the LROC, completed in 1998, produced numerous comments encouraging the Secretary to develop surplus criteria, (see *Federal Register* Vol. 63, No. 9256, at

9258-59 [Feb. 24, 1998].) Many parties, including Reclamation, have long recognized the operational benefits that accrue from development of objective, measurable, predictable criteria to guide operation of important storage reservoirs, such as Lake Mead. At the time of the last review of the LROC, the Secretary found that surplus criteria (and, if adopted, shortage criteria) should: (1) "be specific guidelines that can be used to predict measurable effects in the future, (2) be developed through the AOP process; and (3) include a discussion of the potential effects on Lake Powell spills along with possible mitigation measures." (See *Federal Register* Vol. 63, at 9259).

In response, in 1999, Reclamation proposed adoption of surplus criteria for the operation of Hoover Dam (See *Federal Register* No. 27008, May 18, 1999). The current approach to adoption of surplus criteria differs from that identified in the last LROC review only in that it utilizes a formal NEPA process for evaluation of impacts as opposed to the more informal AOP process established by the Colorado River Basin Project Act of 1968, as amended. In order to build in the ability to respond to actual operating experience, Reclamation also decided to have such criteria implement the provisions of the Decree (Article II(B)(2)) and the LROC (Article III(3)(b)), and be reviewable on a five-year basis at the same time as the LROC is routinely reviewed.

In addition to these operations-based reasons for adopting surplus criteria, current utilization of Colorado River water in the Lower Basin (which exceeds 7.5 maf), listed as one of the factors at Article III(1)(b)(ii) of the LROC, provides an additional basis for both the adoption of surplus criteria and is a factor that Reclamation considered when choosing a preferred alternative. As a result of operating experience over recent years, it is clear that one of the most important issues for Colorado River management is the need to bring use of Colorado River water into alignment with the allocation regime adopted by Congress in section 4 of the Boulder Canyon Project Act of 1928 (BCPA) (see 43 U.S.C. 617c(a)). The pressing need for attention to this important issue is exacerbated by the over-allocation of the Colorado River due to flawed assumptions of its long-term yield that were incorporated into the 1922 Colorado River Compact. For example, the average annual natural flow of the Colorado River at Lees Ferry (1906 to 1998) has recently been estimated at 15.1 maf, while the average prior to the time of the Compact (1906 to 1921) was 18.1 maf. The regime established by the BCPA limits California to 4.4 maf, absent availability of either surplus water or other unused water.

Reclamation intends to insure that the adoption of surplus criteria will provide objective and predictable criteria in a manner that will facilitate the Secretary's enforcement of the basic provisions of the *Law of the River*. As such, when Reclamation commenced this process (see *Federal Register* No. 27008-09, May 18, 1999), it recognized that efforts were underway to reduce California's reliance on surplus deliveries and that it would "take account of progress in that effort, or lack

thereof, in the decision-making process regarding specific surplus criteria." (*Federal Register* Vol. 64, No. 27009). The information available on California's efforts led Reclamation to propose that the term of the surplus criteria parallel the period of key activities for California's planned reduction in use of Colorado River water.

Accordingly, the question of whether to adopt surplus criteria is primarily related to sound water resource management. Having decided that adoption of surplus criteria is appropriate and warranted at this time, the Secretary will consider the impact of interim surplus criteria on California's need for an appropriate implementation period to reduce its over reliance on Colorado River water. As part of his final decision regarding surplus criteria, the Secretary will integrate the California issues with all other aspects of his watermaster duties, particularly its impacts on other state allocations and Tribal users.

In summary, Reclamation believes that adoption of interim surplus criteria is warranted at this time and believes that adoption of such criteria should complement the Secretary's watermaster duties on the lower Colorado River, which include facilitating adherence to the Lower Basin's allocation regime. Further, the adoption of interim surplus criteria is not a component of California's Colorado River Water Use Plan, but should not frustrate California's efforts to reduce its Colorado River usage. As such, Reclamation does not believe that the Purpose and Need statement as presented in the DEIS is inadequate. However, in light of the significant commentary on this issue, and in an effort to clarify the information presented in the FEIS, Reclamation has modified the Purpose and Need discussion in Chapter 1 of the FEIS to reference the relationship between the proposed surplus criteria and California's actions to reduce its dependence on surplus water.

PART A

PUBLIC HEARINGS AND ORAL COMMENTS

PART A - PUBLIC HEARINGS AND ORAL COMMENTS

Reclamation facilitated a series of public hearings to receive oral comments on the DEIS. Public hearings were held between August 21 and August 24, 2000, in the cities of Ontario, California; Las Vegas, Nevada; Salt Lake City, Utah; and Phoenix, Arizona. Each of the individuals who provided oral comments are listed in Table 1, below. Transcripts were prepared for each of the public hearings to provide a written record, and are available upon request.

With one exception, each person who provided oral comments at the public hearings also submitted, or represented an organization that submitted, written comments to Reclamation. Reclamation has reviewed the transcripts of oral testimony and determined that the written comments discussed each of the issues that had been raised in the oral comments made by speakers. Because responses have been provided for each of the specific issues raised in the written comments (see Part B of this volume), Reclamation has determined that responses to oral comments are not necessary (with one exception, as noted below). Table 1 is an index of those providing oral comments and the associated comment letters which contain responses to similar issues raised in the oral comments. Note that one commentor, Mr. Wade Noble, raised issues at the Phoenix, Arizona, meeting that were not specifically reiterated in a written comment submittal. As such, Reclamation has included a transcript of Mr. Noble's statement, and has responded to the issues raised by Mr. Noble in Part B of this volume (see Letter 69).

Table 1
Persons Who Provided Oral Comments at Public Hearings

Name	Organization	Associated Comment Letter in Part B
Ontario – August 21, 2000		
James Bond	San Diego County Water Authority	Letter 27
Gerald Zimmerman	Colorado River Board of California	Letter 39
Las Vegas – August 22, 2000		
George Caan	Colorado River Commission of Nevada	Letter 43
David Donnelly	Southern Nevada Water Authority	Letter 29
David Orr	Glen Canyon Action Network	Letter 10[1]
Salt Lake City – August 23, 2000		
Larry D. Anderson	State Division of Water Resources, Utah	Letter 46
Wayne Cook	Upper Colorado River Commission	Letter 32
Phoenix – August 24, 2000		
Herb Dishlip	Arizona Department of Water Resources	Letter 37
Larry Dozier	Central Arizona Water Conservation District	Letter 14
Doug Fant	Arizona Power Authority	Letter 35
Robert Lynch	Irrigation & Electrical Districts Association of Arizona	Letter 22
Wade Noble	Wellton-Mohawk Irrigation & Drainage District	Letter 69[2]

[1] The Glen Canyon Action Network was one of eleven organizations that jointly submitted comment letter 10 on the DIES.

[2] A transcript of oral comments provided by Mr. Wade Noble has been included in Part B as Letter 69.

PART B

COMMENT LETTERS AND RESPONSES

PART B – COMMENT LETTERS AND RESPONSES

This section contains copies of comment letters concerning the Colorado River Interim Surplus Criteria DEIS that were received by Reclamation. Also included are Reclamation's responses to each of the specific issues raised in these letters.

Comment letters have been categorized according to their source, as listed in the Volume III Table of Contents. Each letter has been subdivided into specific issues to which Reclamation has prepared responses. Specific issues are indicated with vertical black lines marked within the left margin of each letter, with sequential numbering that indicates a reference number for each issue. Responses to each issue are numbered accordingly, and are presented to the right of each letter.

INDIVIDUALS

FEB

Jayne Harkins
Manager of River Operations
Bureau of Reclamation
PO Box 61470
Boulder City, NV 89006-1470.

Tucson, AZ, February 16, 2000.

Dear Mr. Harkins,

1 I strongly support the establishment of interim surplus criteria that include guaranteed flows for the lower Colorado River and its Delta, as outlined in the February 15, 2000 proposal submitted by American Rivers, Defenders of Wildlife, Environmental Defense, Friends of Arizona Rivers, Glen Canyon Institute, Grand Canyon Trust, Sand and Water Fund of the Rockies, the Pacific Institute, Sierra Club, and the Sonoran Institute.

Thank you.

Sincerely,

Garcia Jaqueline

Jaqueline Garcia
jaquelin@ag.arizona.edu
Graduate student
University of Arizona

1. The Pacific Institute Proposal was considered as an alternative but not analyzed in depth for the reasons discussed in Section 2.2.3. See responses to Comment 11-2 and 13-4.

Mark Belles
9318 Willard Street
Rowlett, TX 75088-4403

Regional Director
Lower Colorado Region
c/o Jayne Harkins
BC00-4600
Bureau of Reclamation
P. O. Box 61470
Boulder City, Nevada, 89006-1470

BC00/Harkins
4600

26 August 2000

Dear Reclamation,

Thank you for the review copy of the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement. Please retain my name of the mailing list for this project.

After a thorough review of the DEIS it is apparent that the various alternatives are all very similar and that the distinction between them is simply a matter of degree. All describe a means of of meeting the purpose and need of the project and as reading Table 2-1 reveals, a comparison of them shows there are very small differences between the plans.

I would like to make a case for the **Shortage Protection Plan**, based on following criteria that might appear to have been long sacrificed on the Colorado River.

By my reading, the shortage protection plan will result in the minimum amount of water impounded by dams over the project period. I strongly recommend this alternative on the basis of "Minimum Impact". Clearly, traditional notions of "Leave No Trace" and "Minimum Impact" to the river have long been abandoned in the name of development. No one can look at Glen Canyon Dam and imagine that "Leave No Trace" has ruled the day, but as in most things improvement is made in matters of degree. The operating philosophy of the Colorado River Storage Project should be to **operate the existing system with as little impact as possible to the environment**.

Clearly the impoundment of water behind a dam is a significant impact to the Colorado River, both up and down stream. The choice of alternatives should be the one that impounds the least water for the least time and thus allows the natural river systems to operate as normally as possible.

Thank you for the opportunity to comment,

Mark W Belles

Page 1

1: Reclamation notes the preference for the Shortage Protection Alternative. We also wish to note that while the Shortage Protection Alternative would tend to produce the lowest reservoir levels, it shares with all alternatives the probability that the reservoirs would refill during periods of above-normal runoff.

5055642313 MEMORYMANN T-967 P-001 SEP 06 '00 09:00

6 September 2000

Verna Forbes Willson (Mrs.)
Post Office Box 2778
Farmington, NM 87499-2778

Ms. Janet Steele, Attention: BCOO-4601
Post Office Box 61470
Boulder City, NV 89006-1470

SUBJECT: Colorado River Interim Surplus Criteria:
INT-DES 00-25

Dear Ms. Steele

My only comment on the DSEIS for the subject surplus criteria is this:

"Although the states of New Mexico and Colorado will be those most impacted by a decision that any of their water from either the Animas or San Juan Rivers which drain into the Colorado River might be considered surplus, not one of your meetings prior to opening your DSEIS for public comment was held in either state. How can the public comment on anything from which they have been excluded by distance, lack of information as to meeting dates, and secrecy?"

1

I do have two more questions: How can one intelligently comment when one is not informed that one will be impacted by the dealings of Big Government in situations such as this? Although our appointed local San Juan Water Commission MAY have been informed, our elected representatives on the three City Councils in San Juan County, NM were not made privy to the situation. Why not?

Sincerely,

Verna Forbes Willson

1: The EIS was prepared in close coordination with our Upper Colorado Regional Office in Salt Lake City, Utah. We have relied upon their involvement along with input from stakeholders of the Upper Basin states during the scoping, document preparation and public review processes to ensure Upper Basin issues and concerns are adequately addressed in the EIS. It is not accurate to consider water from the Animas or San Juan rivers, or any other of the Upper Basin tributaries, as surplus. It is only water in Lake Mead that the Secretary could make available for use in the Lower Division states that would be considered "surplus." Impacts of the surplus alternatives to the Upper Basin are limited to changes that may occur to the water levels in Lake Powell.

David Hayes and Robert Johnson
Jayne Harkins,
Manager of River Operations,
Bureau of Reclamation,
PO Box 61470,
Boulder City, NV 89006-1470

February 18, 2000

I support the establishment of interim surplus criteria that include guaranteed flows for the lower Colorado River and its Delta, as outlined in the February 15, 2000 proposal
1 submitted by American Rivers, Defenders of Wildlife, Environmental Defense, Friends of Arizona Rivers, Glen Canyon Institute, Grand Canyon Trust, Land and Water Fund of the Rockies, the Pacific Institute, Sierra Club, and the Sonoran Institute. It would be a grand move!

Free the Colorado

Please do not hesitate to contact me. Thanks -

Eleanor Inskip
3636 Sixteenth St NW #541B
Washington DC 20010

1. The Pacific Institute Proposal was considered as an alternative but not analyzed in depth for the reasons discussed in Section 2.2.3. See responses to Comment 11-2 and 11-6.

Dave Miller
P. O. Box 567
Palmer Lake, CO 80133
(719) 481-2003, Fax (719) 481-3452

SEP 11 2000

September 7, 2000

BC00/ee
4600

2 page fax (702) 293-8042

Ms. Jayne Harkins
Attention BC00-4600
P. O. Box 61470
Boulder City, Nevada 89006-1470

Subject: Public Comment on Draft Environmental Impact Statement, Proposed Colorado River Interim Surplus Criteria

Dear Ms. Harkins:

1 2 3 Subject Draft EIS is seriously flawed because: (1) There is a high probability California's Colorado River Water Use Plan is not sustainable over time; (2) The Plan ignores the increased hydrologic and political risks for Upper Basin States; and (3) The values of additional Upper Basin storage for solving Western water, power and air problems were not considered.

4 An anonymous survey among Southern California water managers would reveal serious doubts regarding California's ability to reduce its dependence on Colorado River water during the next 15 years. Although the Plan's objectives may seem reasonable and logical, a false sense of security can do more harm than good for the entire Western Region, including California. Colorado River Compact guarantees for Upper Basin States would quickly evaporate under the powerful political pressures created by California's thirsty farmers and urban areas during a devastating drought cycle.

5 Any agreement that allocates water surpluses and shortages within Lower Basin States, can also have profound impacts on Upper Basin States. For example, if Arizona uses Colorado River water for groundwater banking during normal conditions, the resulting lower levels in Lake Mead and Lake Powell, could greatly increase political pressures on Upper Basin States during times of hydrologic crisis.

6 Upper Basin States also have good reason to be concerned with the cumulative impacts of the 15 Year Plan with recent federal rule changes and national environmental trends. For example, Interior implemented the Colorado River Endangered Fish Recovery Program without first considering the multi-billion dollar impacts on future Upper Basin storage for drought, growth, and environmental needs on both sides of the Divide. Interior is also claiming in Colorado Supreme Court that federal hydropower operations at the Aspinall Reservoirs preempt Colorado's right to store its unallocated Colorado River entitlements above these reservoirs for consumptive needs of both slopes. National, regional, and local environmental groups continue to use unreasonable tactics to stop cooperative headwater storage projects that could benefit the entire Western Region.

1: Comment noted.

2: Comment noted. Risks to Upper Basin states are limited due to Article III (3) (b) of the Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs pursuant to the Colorado River Basin Project Act of September 30, 1968 (Long Range Operating Criteria - LROC). Pursuant to these documents, equalization criteria for Lakes Mead and Powell are suspended as reservoir elevations decrease and demands increase, delinking effects in the Upper Basin from surplus declarations.

3: Development of additional water storage within the Upper Colorado River Basin would not satisfy the need for the proposed action and is therefore not addressed in this EIS.

4: Comment noted.

5: See response to Comment 5-2 above.

6: Comment noted.

In short, Interior's subject Colorado River proposal should not be signed without a concurrent binding commitment to evaluate, permit, and construct a viable high altitude, off-channel storage capability for Upper Basin States during the same 15 year period. The unprecedented merits of such an overlooked storage program can be quickly determined using Interior's advanced River Ware Model for simulation. A modeling effort will clearly show substantial water quantity and quality benefits for both Upper and Lower Basin States, for a small fraction of the life-cycle cost of alternatives currently being considered. The Southwestern Region's endangered species, recreation, power, and air impacts can also be included in this evaluation.

7 BUREC had one million dollars in its FY 1990 budget for a similar computer study of Colorado's high altitude Gunnison storage sites. Unfortunately, misguided Gunnison activists and Colorado officials were successful in killing this early BUREC effort to objectively evaluate high altitude storage for the Western Region. Regrettably, BUREC has now apparently lost its interest in high storage.

It should also be noted that a 1987 U.S. Army Corps of Engineers' simulation of the South Platte River determined that an average annual 60,000 acre feet from high altitude Gunnison storage could increase the safe-yield of Denver's existing reservoirs by 111,000 acre feet. The additional multiple benefits for the entire Platte and Colorado River systems were not considered. In spite of this Corps of Engineers' study, Colorado's high storage alternatives were improperly excluded from the Final Two Forks Dam EIS for political reasons. These examples are typical of misguided federal, state, and environmental community efforts to prevent development of Upper Basin Colorado River entitlements.

8 In view of the above and the overlooked interrelationships between Upper and Lower Basin water agreements, I respectfully recommend at least a 90 day extension of time for public comment. To allow only 30 days for comments on a proposal that is [illegible] in the making is both dangerous and unprecedented. This is especially true considering the current trends against water development in Upper Basin States.

Sincerely,

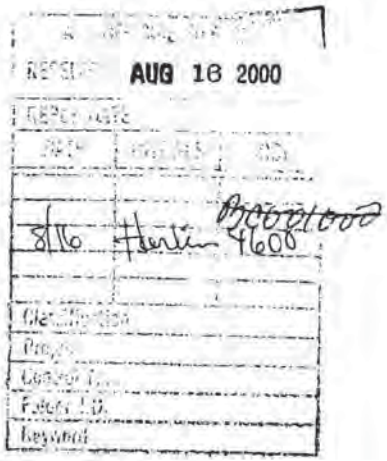
Dave Miller

Dave Miller
Independent Water Planner

cc: Council on Environmental Quality, Western Governors, Congressional Committees

7: As discussed above, the effects of interim surplus criteria on the Upper Basin are limited to changes in Lake Powell water level due to equalization provisions of the Colorado River Basin Projects Act of 1968. Given the current climate surrounding new water storage projects in the West, high elevation storage would take many years for formulation, approval and development. Your suggested commitment is beyond the scope of this EIS, which is to evaluate impacts of proposed criteria for declaring surplus conditions on the Colorado River during the next 15 years.

8: We believe that coordination between the Upper Division and Lower Division states has resulted in an adequate assessment of potential impacts to the Upper Basin. We further believe that no extension of the comment period for the DEIS was warranted. In accordance with Department of the Interior Departmental Manual, the comment period was open for 60 days following filing of the DEIS with EPA. The notice that provided the working draft of the Seven States proposal for consideration along with the DEIS specified that its availability did not change the length of the DEIS comment period.



August 14, 2000

To: Ms Jayne Harkins
Bureau of Reclamation
Attention: BCOO-4600
PO Box 61470
Boulder City, NV 89006-1470

From: Earl Zarbin
3803 E. St. Catherine Ave.
Phoenix, AZ 85040-5013

Subject: Colorado River Interim Surplus Criteria - Draft Environmental Statement

The preferred alternative is the "No Action Alternative."

1 The reason is simple: State of California interests should be required to adhere to the Colorado River water allocations specified in the Boulder Canyon Project Act of 1928, and to California's legislative act limiting the state to no more than 4.4 million acre-feet of water per year from the mainstream of the Colorado River.

State of California interests have been on notice for years, ever since approval of the Colorado River Basin Project Act in 1968, that the State of Arizona would soon be using all its Colorado River entitlement. That entities within the State of California have failed to adjust their water use accordingly is distinctly their problem, and not that of Arizona, Nevada, or the four other Colorado River Basin states.

2 It would be imprudent for any secretary of the Interior to guess as to the future of Colorado River water flows. Surplus conditions should be decided on a yearly basis based on those flows. Further, there is no assurance that State of California interests, at the end of 2015, will not want to continue using more water than California's legal entitlement.

The time to require California to obey the law is today, not in 2016 or sometime after.

1: Comment Noted.

2: Reclamation agrees that attempting to predict future inflows is an impossible task. However, even with specific guidelines in place, the Secretary will utilize Article III(3)(b) of the LROC and the guidelines in making a water supply determination for use by the Lower Division states each year in the AOP process. The establishment of specific guidelines in no way guarantees any of the Lower Division states surplus water over the next 15 years.

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SEP. 6.1999 3:42PM NO.537 P.3/3

American Water Resources, Inc.
1606 HERMOSA PLACE
COLORADO SPRINGS, CO 80906
Phone: 719-633-6969

September 6, 2000

By facsimile 702-293-8042

Jane Harkins
Lower Colorado River Office
Bureau of Reclamation
Boulder City, NV 89006-1470

Dear Ms. Harkins:

I am writing this letter to express my deep concerns on the draft environmental impact statement (DEIS) for the Colorado River Interim Surplus Criteria, currently being considered for adoption. The DEIS is concerned with the determination and distribution of surplus water conditions in the Lower Colorado River Basin during the next 15 years.

1 While environmental impacts must be carefully considered, it is my position that the process for adoption is negative to the Upper Basin states and the real possibility for a train wreck is substantial. In my view, it is unwise for the Upper Basin to enable California's insatiable desire for water by, in effect, putting California on [illegible] amounts to water welfare for the next 15 years, a period commonly referred to as the "interim." What happens in the interim in California, as is the case with any recipient of welfare, a term which denotes "helping the disadvantaged," is that as disadvantaged California's claim to the river is actually strengthened. The state's promised reductions in Colorado River water use will not be realized. California's 15-year reliance on water welfare will put it in a powerful position to show that its needs are greater, its population larger, its economic prowess stronger and more valuable than that of all the other states in the compact.

The truth is that a 15-year interim water welfare state will be a runaway train, unable to slow down and at considerable risk of derailing if any state should try to do so. California is not disadvantaged, but by signing the DEIS, the Upper Basin states would be. There are other solutions which should and must be considered.

Thank you for your time and consideration in this matter. Let's work towards an agreement that will be favorable to everyone, including California.

Very truly yours,

Judith Alberti

Judith Alberti
Vice President

JA/aa

1: Comment noted.

COMMENT LETTER

JUL-17-00 13:11 FROM-KINKOS ARLINGTON HTS ID-8476704148 PAGE 1/3

American Water Resources, Inc.

1606 HERMOSA PLACE
COLORADO SPRINGS, CO 80906

Phone: 719-633-6969

OFFICIAL FILE COPY		
DATE	SURNAME	CODE
Classification		
Project		
Control No.		
Folder		

July 17, 2000

By facsimile 702-293-8042

Jane Harkins
LCR Office
Bureau of Reclamation
Boulder City, NV 89006-1470

Dear Jane:

Thank you for the 81-pound CR interim surplus criteria draft EIS. I have just read Chapter I and have serious concerns:

1 1. The time frame for your meetings and written comments is too close. It does not allow for thoughtful review and deliberation and is not reasonable based on the complexity of issues.

2. Why, as was the case in the June 1999 scoping letter, are no meetings held in the Upper Basin States?

3. Unfortunately, very few are competent and knowledgeable on such technical matters as the DEIS. Notwithstanding this, I believe many good citizens would be alarmed at this process and its potential consequences. This is a dynamic process and I would suggest the possibility of great insight by common people if they are made aware.

4. This report gives me the feeling of a freight train going too fast--why?

5. I know of no water institution in the United States that is ready for long-term drought. The probability of this event has never been higher. Astonishingly, everyone assumes the past 100-year water supply will continue. If I could dictate that all studies could be based on a 1,000-year best estimate of water supply, I would be doing a great favor to everyone, and most particularly California.

RESPONSES

1: CEQ regulations require a 45-day minimum review period for a DEIS, starting after a Notice of Availability is published in the Federal Register. Reclamation's practice is to extend this review period an additional 15 days, allowing for a 60-day minimum comment period. The filing date of the DEIS was July 7, 2000 and the public comment period officially ended on September 8, 2000. Reclamation believes that this 63-day period allowed sufficient time for review and comment on the DEIS. One of the four public hearings to receive public comments on the DEIS was held in an Upper Basin state, in Salt Lake City, Utah. As discussed in the DEIS, the area of potential effect analyzed in the EIS is the Colorado River corridor from Lake Powell down to the SIB. Because the majority of this area is located within the Lower Basin, and because surplus determinations made by the Secretary influence water supply in the Lower Division states, holding the majority of the public hearings within the Lower Basin was determined appropriate. The NEPA process, including scoping and the preparation and distribution of the DEIS and this FEIS, has provided an opportunity for Reclamation to identify and disclose to the public the potential effects of interim surplus criteria.

JUL-17-00 13:11 FROM:KINKOS ARLINGTON HTS ID:9476785150 PAGE 3/3

Ms. Harkins
July 17, 2000
Page 2

2 This report doesn't seem to want to address the relevant "what ifs?" I believe the public has a right to know.

I hope you will consider the need to slow down and include the other half who have the greatest risk—the Upper Basin States and their citizens

Best regards,

American Water Resources, Inc.

Thomas C. Havens

Thomas C. Havens
President

TCH/ea

2: Predictions of future climate are difficult to make, and there are conflicting points of view within the scientific community. Although the index sequential method of modeling using historical records is not a perfect predictor, it provides a rigorous representation of possible future hydrology during the coming decades. Statistical distributions obtained using this method do provide an indication of what could happen during periods of drought, using past drought scenarios as indicators.

SEP. 6,1999 3:41PM NO.537 P.1/3

American Water Resources, Inc.
1606 HERMOSA PLACE
COLORADO SPRINGS, CO 80906
Phone: 719-633-6969

September 6, 2000

By facsimile 702-293-8042

Jane Harkins
Lower Colorado River Office
Bureau of Reclamation
Boulder City, NV 89006-1470

Dear Ms. Harkins:

I have very serious concerns about the DEIS for the Colorado River Interim Surplus Criteria. A scenario of increased drought conditions, which are probable, make the current DEIS a prescription for serious adverse consequences, extreme risk for both the Lower and Upper Basin and possible chaos. I doubt that this agreement is enforceable. It could be dangerously contentious.

1 Since there were no public meetings in Colorado, New Mexico or Wyoming, I believe the owners of this water, the people, are not all aware of the possible consequences. Is it acceptable to drain Lake Mead by 50%? Is Lake Powell vulnerable? It may be that a more balanced and reasoned approach could produce a win/win environment. I would never sign an agreement like this that has been rushed through the process and is neither fair nor wise. We are talking about a multibillion dollar value without protection or compensation for those who are at risk. Why would the Upper Basin put themselves in such a vulnerable and weak strategic position? Why would the Lower Basin assume such a speculative position, based on surplus water that may not be there?

2 The reality is that California needs a more disciplined, creative and economic-based approach. It has many serious, complicated, unresolved and unsigned internal negotiations to conclude. The Upper Basin needs to substantially reduce its risk in this deal. A multimillion dollar contingency fund should be established by California as positive incentive and to cover all the mitigation costs that may arise. The Upper Basin provides its most precious asset—water—and California provides what it has in surplus—money. Fair is fair. This is sound economics and the basis and foundation for a workable and enforceable contract.

1: Reasons the Upper Basin states support adoption of interim surplus guidelines are discussed in the interim surplus criteria proposals submitted by Six-States (see Attachment E), and by the Seven States proposed criteria (see Federal Register notice in Chapter 5). Impacts to the Upper Basin states are based on changes to water levels in Lake Powell, which result from releases to Lake Mead to "equalize" storage between the two reservoirs as discussed in Section 1.4.2 of the EIS. Reclamation is only proposing surplus criteria be in effect for an interim 15-year period, during which time they would be subject to review every 5 years, along with reviews of the LROC.

2: A requirement that California make progress on its Colorado River Water Use Plan may be included in ISC Guidelines. California is responsible for funding any costs associated with compliance and implementation of their plan components. This includes costs for mitigating impacts of those actions that require Secretarial approval as determined by other federal and state environmental compliance documents.

SEP. 6.1999 3:41PM NO.537 P.2/3

Ms. Harkins
September 6, 2000
Page 2

3 The current proposal creates a water welfare state for California whose population of over 30 million is targeted to reach 50 million by 2020, a figure which is more than the combined populations of Arizona, Nevada, Oregon, Idaho, Montana, Wyoming, New Mexico and Utah. California's economic force already represents the seventh largest in the world. Compare this to Wyoming with a population of just 450,000. Should Wyoming be expected to share the risk equally?

In consideration of the DEIS proposal, which would in effect grant water welfare to California, I contend that,

1. California does not need welfare which is negative incentive and bad policy; and,
2. It is always difficult or impossible to reverse a welfare system. It is politically naive to believe California would be ready or willing to give up that benefit.

4 The Colorado River Assurance Program for California is a process out of control. Where is the accountability to the principals, the people? The politicians? We are all familiar with situations where three, five or ten years down the road, after major policy decisions have been made and implemented, inflicting adverse consequences on society, we ask, What were they thinking?

We believe this process could provide win/win solutions to these problems if a broader base of perspectives were applied and a more reasonable time frame was established. Without a solid base, this process will fall apart. We are not there now. Something is missing. Both the Upper Basin and Lower Basin must have the courage to do the right thing, not the politically expedient one.

The environmental issues are a major concern and should be appropriately addressed.

Sincerely,

American Water Resources, Inc.

Thomas C. Havens
President

TCH/aa

3: As noted in EIS section 2.3, the interim surplus criteria would terminate at the end of the 15-year period. In the absence of subsequently specified criteria, surplus determinations would be made as is currently done, as part of the annual operating plan development (AOP) process. If California is not making progress in implementing its Colorado River Water Use Plan, the Secretary may choose to revert back to 70R Strategy or the AOP process during the interim period.

4: Reclamation is not aware of any program or process by this name. It is the intent of this current process to carefully consider any potential adverse consequences of alternative courses of action discussed by this document.

Center for Biological Diversity
Defenders of Wildlife
Environmental Defense
El Centro de Derecho Ambiental e Integración Económica del Sur, A.C.
Friends of Arizona Rivers
Glen Canyon Action Network
Glen Canyon Institute
Pacific Institute for Studies in Development, Environment and Security
Sierra Club
Fred Cagle
Jaqueline Garcia-Hernandez

SEP 14 2000

Via Fax and Mail

BCOO-4600

September 8, 2000

Regional Director
Lower Colorado Region
Attention: Ms. Jayne Harkins (BCOO-4600)
Bureau of Reclamation
PO Box 61470
Boulder City, NV 89006-1470

Re: Draft Environmental Impact Statement on Interim Surplus Criteria

Dear Ms. Harkins:

Thank you for the opportunity to review and to comment on the Draft Environmental Impact Statement ("DEIS") on Colorado River Interim Surplus Criteria. We are supportive of the overall goal of returning California to its 4.4 maf share of the Colorado River, yet we do not believe that such an achievement should come at the expense of downstream riparian and aquatic habitats. The diversion of millions of acre-feet of water and the impoundment of millions more have eroded and desiccated the Colorado River delta in Mexico. Fortunately, since the 1980s flood flows have revegetated the delta which has grown to 150,000 acres, though still a mere 5% of its historic size. As the Department of Interior has recognized, 80 percent of the best Lower Colorado River habitat is in Mexico, yet serious environmental harms are occurring there. The interim surplus criteria provide an opportunity to avoid and mitigate these harms, yet Interior fails to take advantage of this opportunity.

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1 Therefore, we are disappointed that the Bureau of Reclamation ("Reclamation") rejected consideration of the Pacific Institute alternative that would have provided a reliable measure of freshwater flows. We also have several procedural and substantive concerns with the new Seven States proposal, as well as with the DEIS itself. For several reasons, we recommend that a Supplemental DEIS precede the Final EIS: the DEIS omits a reasonable alternative; the uncertain status of the Seven States information precludes effective public comment; the California Colorado River Water Use Plan is not officially available for comment; the transboundary and cumulative impacts analyses are flawed; and endangered species impacts merit more research and evaluation.

A Supplemental DEIS Should Include An "Environmental" Alternative

2 The range of alternatives is an important piece of NEPA – "This section is the heart of the environmental impact statement." 40 C.F.R. § 1502.14. Contrary to Reclamation's conclusion in the DEIS, the Pacific Institute proposal is not within the range of alternatives in the document (2-3). That proposal, supported by 9 other groups, was submitted specifically to dedicate perennial flows through the river to the delta before declaration of a partial surplus and flood waters to the delta before declaration of a full surplus. No other alternative contains these or any other environmental protection or restoration provisions.

Colorado River flows that reach the Delta are the result of flood control releases in the U.S. Deliveries to Mexico were greater than 1.7 maf in only 24 of the years between 1950 and 1998. The alternatives will again halve these odds by 2015 (see Table 3.16-1), as well as reduce the quantities released. The Pacific Institute proposal provides a more reliable source of water to the delta while also providing the Basin states with predictability and California with a supply of water over its apportionment. As a reasonable alternative that satisfies the purpose and need of the surplus criteria, the Pacific Institute proposal and its impacts should be studied.

The California Colorado River Water Use Plan Must Be Included

3 Regarding the purpose and need of Interim Surplus Criteria, it is well known that the driving force behind their development has been the need to reduce California's reliance on Colorado River water above and beyond its apportionment; the 4.4 Plan is California's plan for doing so. See 1-22. The Six State, California and Shortage Protection Alternatives all include implementation of the 4.4 Plan in their modeling assumptions (3.3-9-10). Without the 4.4 Plan it is impossible to measure the quantities of water involved and impossible to gauge California's compliance. However, no version of the 4.4 Plan has been included in the DEIS. The California 4.4 Plan must be made publicly available, as quickly as possible, for public review and comment before the FEIS is released.

Seven States Alternative May Not Appear in the FEIS as the Preferred Alternative

4 On August 8, 2000, Reclamation published a notice of availability of information – the

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1: See response to Comment 11-2 and 11-6.

2: See the response to Comment 11-2 and 11-6.

3: The 4.4 Plan has been superseded by California's draft Colorado River Water Use Plan (CA Plan), which has been publically available from the Colorado River Board of California. For more information see response to Comment 11-11.

4: Based on experience gained in modeling the operation of the alternatives in the DEIS, it was apparent to Reclamation that the shortage triggers proposed by the Seven States would place the effects of operating with those triggers and their related provisions in the midst of the range of the alternatives presented in the DEIS. It was also apparent that the effects of the Seven States Proposal would relate to those of other alternatives as a matter of degree rather than as new and different kinds of impacts. The preferred alternative in this FEIS derived from the Seven States Proposal has been subjected to the same analysis as the other alternatives in the FEIS.

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Seven States proposal – related to this DEIS. 65 Fed.Reg. 48531. While it appears in substance to be another alternative, Reclamation has stated that it will analyze the issues and information in it along with all other public comments on the DEIS, and will not extend the comment period, id., despite the fact that it is modeling the proposal. Even though the 'information' is the "product of significant effort" by the States, Reclamation may not view this new information as an alternative until the proposal's modeling runs and impacts have been subject to the NEPA processes of public notice and comment.

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Furthermore, the proposal in its current form is not within the purpose and need of the interim criteria and is therefore an inadequate proposal. The impetus behind the interim criteria has been increased predictability of availability of surplus waters that California deems necessary to meet its needs until conservation measures are in place that have reduced consumption to 4.4 maf. The Seven States proposal does not provide a starting line by which to measure California's consumption, but given that the state has diverted up to 5.2 maf in recent years and that it expects to conserve a maximum of 490,000 af by 2016, California will not reach the 4.4 maf goal. Section VIII affirms this position by setting standards for enforcement that are even lower than its expected goals. Only when the surplus criteria is based on California reducing its take of the Colorado River to its 4.4 maf share should the criteria be implemented.

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Lastly, the Seven States proposal, in sections IV.B.3.d. & f., excessively constrains the Secretary's discretion, which is simply unacceptable. Allocation of unused apportionment and of surplus has always been entirely within the Secretary's discretion but this proposal attempts to restrict it further than surplus criteria require.

Compliance with the Endangered Species Act

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The scope of the ESA Section 7 consultation on the Interim Surplus Criteria is of enormous importance yet contains several flaws. First, section 5.3.3 must be amended to read that the action area "will be within the 100-year floodplain and Lakes Mead, Mohave and Havasu to full pool elevations of the Colorado River *and downstream to the Gulf of California*" (5-2) (emphasized text added). In this DEIS Reclamation identifies the potential for impacts to the vaquita, totoaba, southwestern willow flycatcher and Yuma clapper rail from the decrease in frequency and amount of freshwater flows to the delta. Therefore, in an ESA consultation where the 'action area' includes "*all areas* to be affected directly or indirectly by the Federal action and not merely in the immediate area involved in the action," 50 C.F.R. § 402.02 (emphasis added), and the Colorado River delta is clearly affected by the proposed action, the scope of the analysis must include the reach of the river and its floodplain down to the Gulf.

In addition, section 5.3.3 on ESA compliance refers *only* to the U.S. Fish and Wildlife Service in caption and text, implying that the National Marine Fisheries Service, the agency with jurisdiction over the vaquita and totoaba, have not been contacted regarding this consultation. See also Letter from Rodney R. McInnis, Acting Regional Administrator, NMFS to David Hogan, Center for Biological Diversity, of July 13, 2000 ("the Bureau of Reclamation has not

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5: Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need for the proposed action, Reclamation policy and operational procedures.

6: The preferred alternative in this FEIS would not change the Secretary's discretion regarding the regulation of Colorado river flows, which stems from the Law of the River. Clause IV.B.3.f contained in the Draft Seven States Proposal is not included in the preferred alternative.

7: Reclamation is consulting with the Service for the delta area of Mexico, as discussed in Section 5.3.4 of the FEIS. The action area extends to the Sea of Cortez.

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contacted NMFS regarding informal or formal ESA consultation on the Department of Interior's Colorado River Interim Surplus Criteria") (Attached). This is in violation of the ESA and contrary to a memo indicated that this consultation has occurred and should continue. See Memorandum from John Leshy, Solicitor to Eluid Martinez, Commissioner, of August 14, 2000. We hope that the August 14 memo is more indicative of the consultation that is occurring on the proposed action and that consultation with both FWS and NMFS continues.

Transboundary & Cumulative Environmental Impact Analysis is Inadequate

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We were encouraged that Reclamation included an analysis of transboundary impacts in the DEIS. However, our hopes that past recognition of the sparse ecological and biological data on the vaquita and totoaba and their effects of modified river flows and water quality would have spurred additional research were dashed when we saw that the most of the analysis of the vaquita and totoaba were taken straight from the Description and Assessment of Operations, Maintenance, and Sensitive Species of the Lower Colorado River (Reclamation 1996). This is especially disappointing because Reclamation already knows its ongoing activities in the Lower Colorado River may affect the totoaba and that the vaquita is the world's rarest cetacean.

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The DEIS omits any discussion of cumulative impacts resulting from the actions in the above Biological Assessment, as well as impacts from the California 4.4 Plan (not referenced in the DEIS) and off-stream banking regulations. For example, Reclamation has found that current operations along the LCR may affect the endangered totoaba, citing the lack of freshwater flows to the delta as a factor. Offstream banking, as well as the interim criteria, will reduce the amount of and probability of freshwater flows to the delta. See Biological Assessment for Proposed Rule for Offstream Storage of Colorado River Water and Delivery of Intentionally Created Unused Apportionment in the Lower Division States (1998) at Table IV-3. There is no attempt to accumulate or mitigate for these impacts. Environmental values and protections are not factored in Reclamation's hydrological models, thus the lack of cumulative impacts analysis is pervasive in the DEIS.

Recommendations

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Overall, we recommend that this DEIS expand its scope, taking into account impacts not only downstream of the NIB, but downstream of the SIB into Mexico and the Colorado River delta. Without discussion or analysis of the impacts, mitigation is impossible. We hope that expansion of the NEPA analysis will result in an expanded ESA consultation and protection and recovery of the critically endangered ecosystem that has been divided by an arbitrary line. A Supplemental DEIS must also include the Pacific Institute proposal, as well as Reclamation's models and impacts analysis for the Seven States submission.

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8: Regarding the effects on species found in both Mexico and the United States (such as the southwestern willow flycatcher), Reclamation is consulting with the U.S. Fish and Wildlife Service. For potentially affected species found only in Mexico, Reclamation is consulting with the National Marine Fisheries Service. Concurrent with these consultations, Reclamation is also continuing its dialog with Mexico to reach mutually agreeable solutions.

9: Cumulative transboundary impacts are discussed in Section 4.2. Implementation of the Lower Colorado River Multi-Species Conservation Program (LCRMSCP) is expected to prevent adverse cumulative effects to the biological resources of the lower Colorado River. The LCRMSCP is being developed to mitigate the adverse effects on resources from current and future water diversions and power production with the cooperation of federal, state, Tribal and other public and private stakeholders. The LCRMSCP will include the creation and enhancement of habitat and augmentation of native fish species populations from Lake Mead to the SIB. The LCRMSCP is evaluating the appropriate amount of acreage for restoration. Currently, acreage estimates range from a low of 3,000 acres to a high of 80,000 acres of riparian woodland, marsh, open water and mesquite habitat.

10: Comment noted. Reclamation believes that the level of analysis for energy resources presented in the EIS appropriately identifies the potential effects of interim surplus criteria.

Sincerely,

David Hogan
Desert Rivers Coordinator
Center for Biological Diversity

Brian Gibbons
Executive Director
Glen Canyon Institute

Kara Gillon
Associate Counsel
Defenders of Wildlife

Michael Cohen
Research Associate
Pacific Institute for Studies in Development, Environment, and Security

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Jamie Newlin
Vice Chair, El Paso Group
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Timothy Flood
Conservation Coordinator
Friends of Arizona Rivers

Fred Cagle
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Glen Canyon Action Network

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Tucson, AZ

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

Sep. 01 2000 11:48AM P2

July 13, 2000

Mr. David Hogan
Center for Biological Diversity
P.O. Box 628
Santa Ysabel, California 92070

Dear Mr. Hogan:

This letter is in response to the Center for Biological Diversity request under the Freedom of Information Act (FOIA), dated June 5, 2000, for documents relating to an informal or formal Endangered Species Act (ESA) consultation which may have occurred between the Bureau of Reclamation and the National Marine Fisheries Service (NMFS) with regard to the Department of the Interior's Colorado River Interim Surplus Criteria.

I understand that you spoke with Ms. Deanna Harwood, staff attorney in the Office of General Counsel, National Oceanic and Atmospheric Administration (NOAA) on July 7, 2000. Ms. Harwood and I appreciate your acceptance of our request for additional time in responding to your request. It is our understanding from that conversation that your interest is limited to whether the Bureau of Reclamation had initiated informal or formal ESA consultation with NMFS. As the Bureau of Reclamation has not contacted NMFS regarding informal or formal ESA consultation on the Department of Interior's Colorado River Interim Surplus Criteria, we have no documents responsive to your request.

Although this does not constitute a denial of your request because there were no records available or withheld, you may appeal this determination within 30 days of receipt of this letter. Appeals shall be addressed to the Office of the General Counsel, Room 5882, U.S. Department of Commerce, 14th Street and Constitution Avenue, N.W., Washington, D.C. 20230, and prominently mark your letter and the outside envelope "FOIA Appeal." Your appeal should state the reasons why you believe this determination was in error. Attach a copy of your original request and a copy of this letter to your appeal.

Sincerely,

Rodney R. McInnis
Acting Regional Administrator

cc: Deanna Harwood

Printed on Recycled Paper

Via Fax and Mail

September 8, 2000

Ms. Jayne Harkins
Attention BCOO-4600
Lower Colorado Region
Bureau of Reclamation
PO Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

These comments are submitted on behalf of Defenders of Wildlife (Defenders). Defenders is a national non-profit, public-interest organization with over 400,000 members and supporters. Defenders works to preserve the integrity and diversity of natural ecosystems, prevent the decline of native species, and restore threatened habitats and wildlife populations.

Thank you for the opportunity to review and to comment on the Draft Environmental Impact Statement ("DEIS") on Colorado River Interim Surplus Criteria. We are supportive of the overall goal of returning California to its 4.4 maf share of the Colorado River, yet its achievement comes at the expense of riparian and aquatic habitats downstream to the Colorado River delta in Mexico. The diversion of millions of acre-feet of water and the impoundment of millions more has eroded and desiccated the delta. Fortunately, since the 1980s flood flows have revegetated the delta which has grown to 150,000 acres, though still a mere 5% of its historic size. As the Department of Interior has recognized, 80 percent of the best Lower Colorado River habitat is in Mexico yet serious environmental harms are occurring there. The interim surplus criteria is a chance to avoid and mitigate these harms, yet Interior completely passes up this opportunity. 1

Therefore, we are disappointed that the Bureau of Reclamation ("Reclamation") rejected consideration of the Pacific Institute alternative that would have provided a reliable and timely delivery of freshwater flows to the Gulf of California. We also have several procedural and substantive concerns with the new Seven States proposal, as well as with the DEIS itself. We recommend that a Supplemental DEIS precede the Final EIS for several reasons: the DEIS omits a reasonable alternative; lack of impacts analysis on the 7 States proposal precludes effective public comment; the California 4.4 Plan is not available for comment; the transboundary and cumulative impacts analyses are flawed; and endangered species impacts merit more research and evaluation. 2

1: The overall goal of the interim surplus criteria is not to return California to it 4.4 maf apportionment. As discussed in Section 2.2.3 of the EIS, providing flows to the Gulf of California would not meet the purpose and need for ISC. The status of habitat along the Colorado River in Mexico is discussed in an analysis of impacts of the interim criteria. Reclamation has concluded that the alternatives would not result in a significant additional harm to downstream habitat and is working with Mexico to collaboratively solve problems in Mexico.

2: A discussed in Section 2.2.3, Reclamation considered the Pacific Institute proposal but eliminated it from detailed analysis. It mirrors the Six States Alternative which was analyzed in depth. The portion of the Pacific Institute proposal calling for delivery of water to the Gulf of California is not within the purpose and need for the action and thus not analyzed. A Supplemental DEIS is not required because it did consider a portion of a reasonable alternative as noted above. See Response 13-4. The Seven States draft proposal and Reclamation's Basin States Alternative analyzed in the EIS are within the range of the other alternatives analyzed and their impacts are very similar to the Six States and California Alternatives. The California 4.4 Plan is not an issue in this EIS and a working draft of California's Colorado River Water Use Plan published in May 2000 has been available for public review through the Colorado River Board of California. Endangered species, transboundary, and cumulative impact analyses have been updated as a normal course proceeding from a draft to a final EIS and no supplement is required.

Exercise of the Secretary's Discretion Would Easily Cure Several of these Flaws

The failure to fully acknowledge the Secretary's discretion in managing the Lower Colorado River, especially when declaring a surplus, is the source of many of the DEIS's deficiencies.

Allocation of surplus water is a discretionary function of the Secretary that can and should be exercised consistent with other responsibilities incumbent upon him for allocating the benefits of the river. Past management decisions and allocations were made before most other responsibilities were articulated in U.S. law and policy. This has resulted in serious environmental harm. The Secretary can and should now use his discretion to ensure that his decisions result in no further harm, and where possible, in an improvement in environmental quality. A myopic characterization of the Secretary's discretion hinders meaningful assessment of the Pacific Institute alternative, transboundary and endangered species impacts, and ESA compliance. 3

Contrary to Reclamation's present public assertions, there is significant discretion in the Law of the River. The Boulder Canyon Project Act and Supreme Court Decree in Arizona v. California established the priorities for Colorado River waters and set flood control, navigation improvement, and flow regulation as the first priorities. The Decree enjoins the Secretary to release water in accordance with these priorities. The other top priorities, regulating the flow of the river and improving navigation, are purely within the Secretary's discretion. See Laughlin River Tours v. Bureau of Reclamation, 730 F.Supp. 1522, 1524 (D.Nev. 1990). Releases for navigation and regulation of the flow, like flood control releases, are not subject to the injunction for consumptive use amounts in Article II of the Decree. The Secretary has a public trust responsibility to protect resources that belong to the public and are so important to society that private uses cannot be allowed to interfere with public access and use.

Reclamation asserts that "[w]ater cannot be released from storage unless there is a reasonable beneficial use for the water unless required for flood control or dam safety." (3.3-1). Time and again Reclamation claims that the same 'Law of the River' that grants the Secretary of the Interior broad discretion in managing the Lower Colorado River also curtails his ability to release water and manage the river's flow. This is even more amazing in a discussion of surplus declarations, a completely discretionary task. While in the past Reclamation has narrowly defined its discretion in order to avoid ESA consultation, in this case, Reclamation has done so in order to avoid analyzing an alternative that accounts for the entire Colorado River ecosystem, and to narrow the scope of NEPA and ESA consultation. 4

When the Secretary announced last December that surplus must be determined and allocated with no net loss of environmental benefits, he set a significant environmental standard. As the Department of Interior has recognized in past statements and in the Joint Declaration to Enhance Cooperation in the Colorado River Delta, the delta is a integral part of the Lower Colorado River ecosystem. No water shall be considered surplus until the Secretary has been 5

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3: See above response. Note that the EIS presents information with regard to Colorado River flows to Mexico under baseline conditions and the alternatives. Note also that additional information has been added to the discussion of these flows in Section 2.16.5 of the FEIS. The allocation of surplus water is not discretionary. The decree issued March 9, 1964 by the United States Supreme Court in Arizona v. California apportioned surplus water for use as follows: 50% for use in California, 46% for use in Arizona and 4% for use in Nevada. However, the Secretary must annually adopt an Annual Operating Plan (AOP) for operation of the Colorado River reservoirs. The AOP establishes the plan of operations for Colorado River reservoirs during the coming year and establishes whether the coming year will be a surplus, normal or shortage year. The Secretary's discretion lies in his determination as to whether sufficient water is available for release to satisfy consumptive use in Arizona, California and Nevada in excess of 7.5 maf. In making this determination, the Secretary considers existing water storage conditions in the Colorado River basin and projected inflows and beneficial consumptive use requirements of Colorado River mainstream use. The respondent commented that releases for navigation and regulation, like flood control releases, are not subject to the injunction for consumptive use amounts set forth in Article II of the Decree. However, in the case cited by the respondent, Laughlin River Tours, Inc. et al. v. Bureau of Reclamation et al., the United States District Court stated the following: "each of the priorities is interdependent on the other, and the Secretary has broad discretion in meeting the needs of [lower] priorities. . . . " The court found that Section 6 of the Boulder Canyon Project Act does not require the Secretary to maximize first priority purposes before establishing criteria to meet lower priorities. The Secretary must operate the Colorado River System in a manner that complies with the water release requirements set forth in Article II of the Decree, but each priority cannot be looked at individually at the expense of ignoring the others.

4: As discussed above, Reclamation agrees that the Secretary not only has broad discretion in making surplus water available for beneficial use in the Lower Division states while meeting treaty obligations to Mexico, but is responsible for doing so. Reclamation's requirement to release water only for reasonable beneficial use pertains only to use within the Lower Division states; we are not responsible for accounting for use of water delivered to Mexico. Reclamation has not avoided ESA consultation by narrowly defining its discretion; in fact it was the process of consulting on on-going operations that finally resulted in a clear definition of the Secretary's discretionary authority. Reclamation believes the scope of this NEPA analysis and concurrent ESA consultation for proposed interim surplus criteria is consistent with the Secretary's discretion and responsibilities as water master of the lower Colorado River.

5: The Secretary's statements, in his December 1999 address, were not intended to be contrary to federal law or treaty. The Defenders of Wildlife definition of surplus is not contained in the Decree. The Secretary recognized, in his statement, the need for greater cooperation with Mexico and for consultation on delta issues in the Joint Declaration. Other mechanisms that the Department of the Interior, and particularly the Bureau of Reclamation, have been working on include the Joint Declaration and the follow-up conference held October 11, 2000, in Washington, D.C. Reclamation is also actively participating in the Fourth Technical Work Group (Delta Task Force), which is a bi-national group working to conduct a joint baseline study of the water and natural resource conditions in the Cienega de Santa Clara and the adjoining lowermost part of the delta of the Colorado River utilizing the resources of these agencies in monitoring, field work, photography and data exchange.

cont'd assured, through a plan of releases of sufficient instream flows, mitigation, and other measures, that additional consumptive use would cause 'no net loss' of the environmental benefits that would result if the potential "surplus" were left in the river. The Secretary clearly has the discretion to meet this challenge and the Mexican section of the IBWC has also requested that the environment be considered a user of Colorado River surplus waters. In the spirit of the Joint Declaration, the Secretary must not renege on this gesture of goodwill.

Range of Alternatives Should Have Included Pacific Institute Proposal

6 The range of alternatives is an important piece of the National Environmental Policy Act ("NEPA") – "This section is the heart of the environmental impact statement." 40 C.F.R. § 1502.14. Contrary to Reclamation's conclusion in the DEIS, the Pacific Institute proposal is not within the range of alternatives in the document (2-3). That proposal has been endorsed by 12 groups, including Defenders of Wildlife, representing millions of citizens. Pacific Institute's proposal was submitted specifically to dedicate perennial flows to the delta before declaration of a partial surplus and flood waters to the delta before declaration of a full surplus. No other alternative contains these or any other environmental protection or restoration provisions.

7 This is one of several instances where Reclamation has improperly stated its authority regarding management of the River. The DEIS states that "the delivery of water to or through Mexico would require modification of the Treaty" (2-3). This is incorrect. The Treaty requires the U.S. to deliver a minimum quantity of flows to Mexico; it does not limit the amount of water the U.S. may deliver. In fact, in 1998, the U.S. delivered more than 3 maf over Treaty obligations; in 1984, the U.S. delivered nearly 14 maf over Treaty obligations. See Figure 3.1-6 Salton Sea Restoration Draft EIS/EIR (2000).

8 Colorado River flows that reach the Delta are the result of flood control releases in the U.S. Deliveries to Mexico were greater than 1.7 maf in only half of the years between 1950 and 1998. The alternatives will again halve these odds by 2015 (see Table 3.1-1), as well as reduce the quantities released. The Pacific Institute proposal provides a more reliable source of water to the delta while also providing the Basin states with the predictability of surplus declarations that they seek. As a reasonable alternative that satisfies the purpose and need for surplus criteria as well as the overall purpose of NEPA – "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" – the Pacific Institute proposal and its impacts should be studied.

New Information From the Seven States Cannot Be an Alternative

9 On August 8, 2000, Reclamation published a notice of availability of information – the 7 States proposal – related to this DEIS. 65 Fed.Reg. 48531. While it appears in substance to be another alternative, Reclamation has stated that it will analyze the issues and information in it along with all other public comments on the DEIS, and will not extend the comment period, id., despite the fact that it is modeling the proposal. Even though the "information" is the "product of

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6: An EIS need not consider an infinite range of alternatives, only reasonable and feasible ones and those reasonably related to the purposes of the project that afford a reasoned choice by the decision maker. The rule of reason shall be utilized in development of a range of alternatives. NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences. For these reasons, Reclamation considered the Pacific Institute proposal but eliminated it from further analysis because part of it did not meet the purpose and need of the proposed action and the remainder of the alternative mirrored the Six State's Alternative which was analyzed in depth for the DEIS. Please also refer to the response to Comment 11-2.

7: The determination of guidelines or criteria for the surplus defined in the Treaty is beyond the purpose of and need for interim surplus criteria. Water delivery to Mexico is regulated by the Treaty and various treaty modifications based on consultation between the United States and Mexico. The 1984 and 1998 deliveries were uncontrollable flood flows.

8: Because the domestic elements of the Pacific Institute's proposed interim surplus criteria are similar to, and within the range of, those contained in the alternatives already being analyzed, and because the delivery of additional water to Mexico is beyond the purpose and need for interim surplus criteria, the Pacific Institute's proposal is not analyzed in this FEIS.

9: The stated purpose is to provide greater predictability of when surplus water is and is not available to assist in the Secretary's management of the lower Colorado River for all states and water users. Reclamation has fashioned a new alternative based on the Seven States proposal and believes this alternative does fit within the purpose and need for this action.

significant effort" by the States, Reclamation may not view this new information as an alternative until the proposal's modeling runs and its environmental impacts have been subject to the NEPA processes of public notice and comment.

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The 7 States proposal as it now reads is not a viable NEPA alternative because it is not within the purpose and need of the interim surplus criteria. The impetus behind the interim criteria has been increased predictability of availability of surplus waters California deems necessary to meet its needs until conservation measures have reduced diversions to 4.4 mafy. The 7 States proposal does not provide a starting line by which to measure California's consumption, but given that the state has diverted up to 5.2 maf in recent years and that it expects to conserve a maximum of only 490,000 af by 2016, California will not reach the 4.4 maf goal. Section VIII affirms this position by setting standards for enforcement that are even lower than its expected goals.[1] Only when the surplus criteria is based on California committing to reduce its take of the Colorado River to its 4.4 maf share should any interim surplus criteria be implemented.

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There are also several aspects of the Guidelines that are simply unacceptable. Section IV, *Determination of Lake Mead Operation During the Interim Period* of the 7 States proposal, in subsections B.3.d. & f., excessively constrains the Secretary's discretion and must be removed. Allocation of unused apportionment and of surplus has always been entirely within the Secretary's discretion but this proposal attempts to restrict it further than interim criteria require.

The DEIS Contains Numerous Deficiencies Which Only a Supplemental DEIS Can Repair

The California 4.4 Plan Must Be Made Available

11

Regarding the purpose and need of Interim Surplus Criteria, it is well known that the driving force behind their development has been the desire to reduce California's reliance on Colorado River water above and beyond its apportionment, the 4.4 Plan is California's plan for doing so. See 1-22. The Six State, California and Shortage Allocation Alternatives all include implementation of the 4.4 Plan in their modeling assumptions (3.3-9-10). Without the 4.4 Plan it is impossible to measure the quantities of water involved. Without the 4.4 Plan it is impossible to gauge California's compliance. However, no version of the 4.4 Plan has been included in the DEIS. The California 4.4 Plan must be made publicly available, as quickly as possible, for public review and comment before the FEIS is released.

[1] It bears note that although the chart on 65 Fed. Reg. 48535 expects California will reduce its take by 340,000 af by 2006, 460,000 af by 2011 and 490,000 af by 2016, the chart illustrating the measure of enforcement requires conservation of only 280,000 af by January 1, 2006 and 380,000 af by January 1, 2011, and no goal for 2016.

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10: After a review of the criteria in the Working Draft Seven States Proposal, Reclamation formulated the Basin States Alternative to match that proposal as closely as possible while maintaining consistency with the Law of the River and current operating policy. Reclamation considered the informal discussions with the public during the public review period and comments received on the DEIS.

11: The California Colorado Water Use Plan is not part of this federal action (see response 57-15). The quantities of surplus water made available under each surplus alternative are now detailed in Chapter 2. The specific deliveries to California under the preferred alternative (Basin States) are shown in Figure 3.4-2 and detailed in Attachment H. A draft of the Plan was made available on Coachella Valley Water District's website (www.cvwd.org) prior to the release of the DEIS.

Allowable Uses of Surplus Waters Must Be Limited

12 Although not discussed in the DEIS, the allowable beneficial uses of the surplus waters will, to an extent, dictate the future availability of surplus waters and thus warrant comment. For example, under some circumstances a state may dedicate considerable amounts of surplus water to groundwater banking rather than municipal and industrial (M&I) uses, thus lowering reservoir levels to the point where space-building or flood control releases are not necessary. Any interim surplus criteria must limit the uses of its water to M&I, particularly in California where the aim of the surplus declaration is to keep the Colorado River Aqueduct full. Likewise, any surplus criteria must limit the declaration of available surplus to that necessary to keep the CRA full to meet MWD's 1.212 maf entitlement, and no more. Thus, the 7 States proposal, IV.B.2.a., calling for 1.250 maf for the CRA during a Full Domestic Surplus, must be amended to supply no more than 1.212 maf.[2]

Affected Environment and Environmental Consequences

Assumptions

Reclamation makes three assumptions relating to the operation of the baseline and the alternatives. These assumptions need elaboration before issuance of the Final EIS. The first, assumption of implementation of the 4.4 Plan, is discussed above.

13 Next, according to the assumptions common to all, Mexico will receive a surplus declaration of 200 kaf only under Lake Mead flood control releases (3.3-9). As stated earlier, the Treaty sets only a minimum delivery requirement, not a maximum. Mexico is eligible to receive surplus waters in years other than flood control releases; to assume otherwise may tie the U.S.'s hands in future negotiations under the Treaty. This DEIS may not *de facto*, establish a Mexico surplus declaration trigger.

14 Lastly, at the August 15 Hydrologic Modeling Meeting, Reclamation announced that operation of the Yuma Desalting Plant beginning in 2015 is an assumption common to all alternatives. Yet, it was not included in the DEIS and thus there is no clarification as to why it is an assumption. Its omission is doubly troublesome because operation of the plant will have significant environmental impacts on the delta, particularly the Cienega de Santa Clara. Section 3.16.6.1, POTENTIAL EFFECTS TO HABITAT IN MEXICO, summarily concludes that this action will not affect the Cienega without observing that operation of the plant would cut return flows to the

[2] In addition, Section IV.B.1.a. should be amended to read "The amount offset under 2.) shall not be less than 100,000 af in 2001 and will be increased by 20,000 af over the Interim Period so as to equal 400,000 af in 2016." When stated this way, it makes more sense, that California will increase the amount of groundwater withdrawals and other options over the 15 years, rather than decrease.

5

12: Reclamation agrees that the use of surplus water for groundwater recharge when storage in Lake Mead and Lake Powell have been partially depleted increases the risk of subsequent shortages and intensifies the effects on other resources. This is recognized in the derivation of the permitted amounts of surplus water to be made available to the Lower Division states with the lower Lake Mead water level surplus triggers. As can be seen in the surplus water quantities cited in Chapter 2, the surplus water available would be lower at lower Lake Mead water levels. However, such provisions are not included in the Shortage Protection Alternative because that alternative represents an extreme that helps to define the range of options for interim surplus criteria.

13: The purpose of this action, as stated in Section 1.1.1 of this FEIS, is to adopt interim surplus criteria for delivery of surplus water to Arizona, California and Nevada. This proposed action is NOT intended to identify conditions when Mexico may schedule this additional 0.2 maf, as stated in Section 1.1.4 of this FEIS. Delivery of surplus water to Mexico during Lake Mead flood control releases is strictly a modeling assumption as stated in Section 3.3.3.3.

14: Operation of the Yuma desalting plant was strictly a modeling assumption. It should be noted that the U.S. recognizes that it has an obligation to replace, as appropriate, the bypass flows. The assumptions made herein, for modeling purposes, do not necessarily represent the policy that Reclamation will adopt for replacement of bypass flows. The assumptions made with respect to modeling the bypass flows are intended only to provide a thorough and comprehensive accounting of Lower Basin water supply. The U.S. is exploring options for replacement of the bypass flows, including options that would not require operation of the Yuma Desalting Plant.

Cienega to a third of their current flows, while tripling their salinity.

Scope

15 The potentially affected area should not end at the NIB. NEPA directs federal agencies to analyze the effects of proposed actions to the extent that they are reasonably foreseeable, regardless of where those impacts may occur. The DEIS includes a transboundary impacts analysis, in accordance with CEQ Guidance on NEPA Analyses for Transboundary Impacts, yet limits the affected area to the NIB between the U.S. and Mexico. This is inconsistent with the scope several of the connected and ongoing actions – the Lower Colorado River Multi-Species Conservation Program and Biological and Conference Opinion on Lower Colorado River Operations and Maintenance – and with the scope of the actual impacts.

Water Quality

16 A more liberal declaration of surplus will lower Lake Mead and adversely affect the water quality of the Colorado River. It is a violation of NEPA simply to assume that the Colorado River salinity control program will maintain the Clean Water Act's water quality criteria. NEPA requires that Reclamation take a hard look at the potential impacts of a project and perform a rigorous analysis based on the best available information.

One author has theorized that a 9 maf drawdown would permanently increase salinity by 96 mg/L below Hoover Dam and by 72 mg/L at Parker and Imperial Dams. This increase would likely offset the impact from any salinity control projects. In addition, any beneficial impacts from a temporary increase in flows would be minor compared to this permanent increase, and would only benefit flows to Parker because the largest diversions are at Parker and Imperial. TDS levels would fall 6 mg/L for each 1 maf released for each three-year average, which requires a 3 maf release over three years and a detrimental increase of 32.1 mg/L at Hoover Dam and 23.7 mg/L at Parker and Imperial Dams with a temporary reduction of 6 mg/L. See *Salinity of Colorado River Water: Causes, Consequences, and Remedies*, "Water Strategist," vol.10, no.1 (Spring 1996). The Mexican section of the IBWC has also cited the increase in downstream salinity as an impact. (Att. Q.) Reclamation cannot in good faith dismiss these, and other, concerns. (3.16-3.)

17 While the effects of interim criteria on water quality among the various alternatives may be accounted for in the modeling, the effects of the surplus declarations themselves are not. As a result, this section requires elucidation. For example, the DEIS estimates that 1,478,000 tons of salt will need to be removed from the Colorado River system, (3.5-6), but provides no source or rationale for that number. Does this estimation take into account a drawdown of Lake Mead, or only current and planned projects?

6

15: The FEIS includes an analysis of impacts for the Limotrophe Division (from the NIB to the SIB). The area of potential effect described in Section 3.2 is associated with areas in the U.S. The transboundary analysis considers potential effects in Mexico consistent with NEPA and CEQ guidelines. The area considered in Mexico is described fully in Section 3.16.

16: The seven state Colorado River Basin Salinity Control Forum, in cooperation with Reclamation, USDA, BLM, the US Fish and Wildlife Service and EPA has, since 1972, been overseeing the plan of implementation to maintain the salinity at or below the adopted criteria. Maintenance of the criteria is the result of rigorous analyses. The plan is reviewed every three years and approved by EPA.

17: The basis for the 1,478,000 tons of salt control is described in the "1999 Review - Water Quality Standards for Salinity Control Colorado River System" prepared by the Forum.

Transboundary Impacts Analysis is Flawed

18 Existence of a political boundary has provided opportunity to muddy the extent of the Secretary's discretion in managing the Lower Colorado River. Just as in the section dismissing the Pacific Institute proposal, the DEIS contains misleading statements regarding water deliveries to Mexico and flows beyond the border. For example, the DEIS avers that the reductions in Colorado River flows that have adversely affected the delta ecosystem "have been instituted through an international treaty." (3.16-13). As explained above, the Treaty sets *minimum* requirements for deliveries to Mexico; the DEIS should clarify that reductions in historic flow to the delta are the result U.S. actions.

19 Further, the claim that "potential effects on Mexico's resources cannot be specifically determined due to the uncertainty of water use once it flows across the NIB into Mexico," (3.16-1), is simply untrue. Morelos Dam, to which the U.S. is obligated to deliver a portion of Mexico's Treaty waters, is below the NIB. Twenty-three miles from the NIB to the SIB is bordered by the U.S. By managing and bordering the river below the NIB, the U.S. cannot claim ignorance once water crosses the NIB. In fact, Reclamation does possess data concerning the use of water in Mexico:

> relatively little of the water in excess of the 1.5 to 1.7 MAFY treaty allocation is diverted for irrigation. Diversions to irrigation canals below Morelos Dam exceeded 1.7 MAFY in only 14 of the 24 years since 1950 in which deliveries to Mexico were greater than 1.7 MAFY. In those 14 years, an average of about 523,000 AFY was diverted to irrigation canals. . . . Therefore, on average, about 10 percent of the flood flows were diverted for irrigation in those 14 years.

20 Salton Sea Restoration Draft EIS/EIR (Reclamation 2007) at 4-23. In other words in 24 of 48 years excess flows have reached Morelos Dam and in 14 of those 24 years Mexico diverted a small fraction of that water. In all of those 24 years Mexico sent flows to the delta and in the other 24 years no flows reached the delta. Interim surplus criteria will ensure that excess flows reach the delta even more sporadically, if at all.

Sensitive Species

21 We were encouraged that Reclamation included an analysis of transboundary impacts in the DEIS. However, our hopes that Reclamation would initiate research efforts to combat their earlier recognition of the sparse ecological and biological data on the vaquita and totoaba were dashed when we saw that the most of the analysis of the vaquita and totoaba were taken straight from the Description and Assessment of Operations, Maintenance, and Sensitive Species of the Lower Colorado River (Reclamation 1996). The deficiencies from that analysis have not been remedied and carry the same lack of research and information from 1996 into 2000. This is especially disappointing because Reclamation already knows its ongoing activities in the Lower Colorado River may affect the totoaba and is unsure about their effects on the vaquita, the

7

18: Comment noted. Section 3.16.6.1 has been revised to state that "... reductions have been instituted while meeting the requirements of an international treaty and the diversion and use of such Treaty water is solely of Mexico's discretion." At least since execution of the Treaty, it is incorrect to state that responsibility for reductions of flows to the Colorado River delta lies with United States interests alone.

19: Section 3.16 has been revised to reflect available information at NIB. Mexico retains control at Morelos Dam as to what is done with the water that arrives there. However, excess water diverted may not be consumptively used in Mexico, but released back to the Rio Hardy and Colorado River as waste and/or irrigation drainage. No data is available to Reclamation on the amount of these wasteway and drainage return flows, so final disposition of diverted water is not known by Reclamation.

20: See above response. Note that the EIS presents information with regard to Colorado River flows to Mexico under baseline conditions and the alternatives. Note also that additional information has been added to the discussion of these flows in section 3.3.4.5.4 entitled "River Flows between Imperial Dam and Morelos Dam" of the FEIS.

21: See response to Comment 10-8.

cont'd | world's rarest marine mammal.

Moreover, there are numerous references in the text for which complete citations are not provided or for which basic information has been overlooked. Standing alone, these omissions are not particularly serious; however, in the context of full disclosure and rigorous investigation, they raise questions about the quality of the workmanship. Omissions coupled with conclusions not supported by existing data raise real concerns about the product. Please amend the following pages:

(3.16-16)

22 | • the vaquita is listed as endangered by the U.S. government, 50 Fed.Reg. 1056 (January 9, 1985), the Mexican government, Normas Oficiales Mexicanas NOM-059-ECOL-1994; and 'critically endangered' by the IUCN;

23 | • (Taylor and Gerrodette 1993) is not in References Cited;

24 | • (Barlow et al. in press) should read (Barlow et al. 1997) and the reference should reflect that change. The title should read "First Estimates..." and contain an updated citation;

(3.16-17)

25 | • (Rojas-Bracho) is not in References Cited, and with no title or date, it is hard to determine its relevance;

26 | • impact analysis for the vaquita does not incorporate more recent research published in volume 15 of Marine Mammal Science;

27 | • the totoaba is listed as endangered by the U.S. government, 44 Fed.Reg. 29478 (May 21, 1979) and the Mexican government, Normas Oficiales Mexicanas NOM-059-ECOL-1994;

28 | • the analysis of effects on the totoaba must acknowledge that Reclamation has already found that its operations and activities in the Lower Colorado River may affect the totoaba;

29 | • the statement that the totoaba "was included in this assessment at the suggestion of the Service and a number of public stakeholders" should be removed. This appears to be taken from the Biological Assessment (1996) and is not applicable here;

(3.16-18)

30 | • status of a recovery plan for the southwestern willow flycatcher should reflect any changes since 1996;

8

22: This information is included in Reclamation's analysis.

23: This correction has been made.

24: This citation has been corrected.

25: This citation has been added.

26: Recent research for the vaquita has been incorporated in the analysis.

27: The information has been cited in the analysis for the totoaba.

28: The analysis is recognizes effects of past, current and reasonably foreseeable operations on the totoaba as part of the baseline condition.

29: This statement has been removed. Reclamation has received input supporting and opposing analysis of impacts on the totoaba in Mexico.

30: The recent completion of a recovery plan for the southwestern willow flycatcher is noted in the analysis, and is limited to activities in the United States.

31 (3.16-24)
• similar to above, status of recovery actions for the Yuma clapper rail should reflect any changes since 1994;

32 (3.8-17)
• the yellow billed cuckoo has been petitioned for listing under the ESA and the FWS has published a 90 day finding that listing may be warranted.

Cumulative Impacts

33 The DEIS states that current circumstances and expected future actions have been "included in system modeling" and thus cumulative impacts have been "incorporated into modeling." (4-1.) Impacts from actions such as the California 4.4 Plan (canal linings, intrastate transfers, groundwater banking, etc.), interstate transfers through off-stream banking, the uses of surplus water and day-to-day operations and maintenance activities along the lower Colorado River are not included in the modeling. Environmental variables – fish and wildlife, endangered species, native vegetation – are not included in the modeling and must be described in the cumulative impacts section of the DEIS.

34 Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions . . ." 40 C.F.R. § 1508.7. See also Considering Cumulative Effects Under the National Environmental Policy Act (CEQ 1997). Reclamation has found that current operations along the LCR may affect the endangered totoaba, citing the lack of freshwater flows to the delta as a factor. See Description and Assessment of the Operations, Maintenance and Sensitive Species of the Lower Colorado River (Reclamation 1996). Offstream banking, as well as the interim criteria, will reduce the amount of and probability of freshwater flows to the delta. See Biological Assessment for Proposed Rule for Offstream Storage of Colorado River Water and Delivery of Intentionally Created Unused Apportionment in the Lower Division States (Reclamation 1998) at Table IV-3. There is no attempt to accumulate these environmental effects in the DEIS. Environmental values are not factors in Reclamation's hydrological models, thus this lack of cumulative impacts analysis is pervasive in the DEIS.

Mitigation

35 The direct, indirect and cumulative impacts to sensitive species, to native habitat, to water quality, and to the Lower Colorado River ecosystem as a whole is significant. According to CEQ guidance, a proposed action with significant effects must consider all of its effects on the environment, whether or not significant, and mitigation measures covering the range of impacts must be developed. See 40 C.F.R. §§ 1502.14(f), 1502.16(h), 1508.14. Furthermore, all relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies, and thus would

9

31: The analysis includes an update for the Yuma clapper rail.

32: This information on the yellow-billed cuckoo is included.

33: As discussed in the EIS, the potential effects on system conditions (including reservoir elevations and river flows) were determined by modeling potential future conditions under baseline conditions and each of the alternatives. To the extent possible, expected future actions that would affect system conditions were included in system conditions modeling, and the impacts of these actions are therefore accounted for in the resource analyses in Chapter 3 of the EIS. In addition, implementation of the LCRMSCP is expected to prevent adverse cumulative effects to the biological resources of the lower Colorado River. The LCRMSCP is being developed to mitigate the adverse effects on resources from current and future water diversions and power production with the cooperation of federal, state, Tribal and other public and private stakeholders. The LCRMSCP will include the creation and enhancement of habitat and augmentation of native fish species populations from Lake Mead to the SIB. The LCRMSCP is evaluating the appropriate amount of acreage for restoration. Currently, acreage estimates range from a low of 3,000 acres to a high of 30,000 acres of riparian woodland, marsh, open water and mesquite habitat.

Section 4.2 has been modified and Reclamation beleives that it has appropriately addressed potential cumulative effects of the proposed action.

34: See response to Comment 10-9.

35: No significant impacts have been identified that require specific mitigation. However, Section 3.17 has been added to the FEIS to discuss environmental commitments that Reclamation would undertake upon adoption of interim surplus criteria through the Secretary's Record of Decision.

cnt'd

not be committed as part of the RODs of these agencies. 40 C.F.R. §§ 1502.16(h), 1505.2(c). There is no discussion of mitigation in the Draft EIS; mitigation measures must be included in the Final EIS.

Compliance with the Endangered Species Act

36

The scope of the ESA Section 7 consultation on the Interim Surplus Criteria is of enormous importance yet contains several flaws. First, section 5.3.3 must be amended to read that the action area "will be within the 100-year floodplain and Lakes Mead, Mohave and Havasu to full pool elevations of the Colorado River *and downstream to the Gulf of California*" (5-2) (emphasized text added). In this DEIS Reclamation identifies the potential for impacts to the vaquita, totoaba, southwestern willow flycatcher and Yuma clapper rail from the decrease in frequency and amount of freshwater flows to the delta. Therefore, in an ESA consultation where the 'action area' includes "*all areas* to be affected directly or indirectly by the Federal action and not merely in the immediate area involved in the action." 50 C.F.R. § 402.02 (emphasis added), and the Colorado River delta is clearly affected by the proposed action, the scope of analysis must include the reach of the river and its floodplain downstream to the Gulf.

37

In addition, section 5.3.3 on ESA compliance refers *only* to the U.S. Fish and Wildlife Service in caption and text, implying that the National Marine Fisheries Service, the agency with jurisdiction over the vaquita and totoaba, have not been contacted regarding this consultation. Communications with NMFS confirm this. See Letter from Rodney R. McInnis, Acting Regional Administrator, NMFS to David Hogan, Center for Biological Diversity, of July 13, 2000 ("the Bureau of Reclamation has not contacted NMFS regarding informal or formal ESA consultation on the Department of Interior's Colorado River Interim Surplus Criteria") (Attached). This is in violation of the ESA and contrary to a memo indicating that this consultation has occurred and should continue. See Memorandum from John Leshy, Solicitor, to Eluid Martinez, Commissioner, of August 14, 2000. We agree that the August 14 memo is more indicative of the consultation that is occurring on the proposed action and that consultation with both FWS and NMFS continues.

38

In conclusion, section 3.16.6.1, POTENTIAL EFFECTS TO HABITAT IN MEXICO, is an argument against, rather than for, the implementation of surplus criteria. The second and fourth full paragraphs at 3.16-13 claim that "the potential magnitude of these excess flows is not affected by interim surplus criteria" because "all alternatives plus baseline indicate a decrease in frequency of flood control releases and flow amounts." However, two paragraphs later the analysis concludes "[s]pecial status species that utilize the riparian habitat along the Mexican reach of the Colorado River could be affected by the decrease in frequency of flood control releases and amounts of flow past Morelos Dam." Since declaration of a surplus is discretionary with the Secretary, he must ensure that the adverse impacts to endangered species from any type of surplus declaration are avoided. When read in conjunction with graphs showing the higher probabilities under the baseline and flood control alternative, this also suggests that the environmental harms of the other alternatives are significant and outweigh the benefits of any

36: The action area extends to the Sea of Cortez. Reclamation is consulting with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for the delta area of Mexico and effects of the interim surplus criteria on species that occur in both the U. S. and Mexico or only in Mexico are discussed in Section 3.16, Transboundary Impacts.

37: Reclamation is informally consulting with NMFS, as described in Section 5.3.5 of the FEIS. Reclamation's assessment of effects on the vaquita and totoaba in Mexico is also included in Section 3.16.6 of the FEIS. The August 14 memo is included in Attachment S.

38: As indicated by response to Comment 11-36 above, the analysis of effects to special status species in Section 3.16 has been revised. Reclamation has concluded that implementation of interim surplus criteria may affect, but is unlikely to adversely, some species and is consulting with the U.S. Fish and Wildlife Service and NMFS, as required by Section 7 of the ESA.

cont'd | interim criteria.

Recommendations

39 | In sum, the DEIS underestimates the potential environmental impacts of interim surplus criteria. By narrowly defining the scope of the Secretary's discretion in managing the Lower Colorado, Reclamation has effectively diminished the area of potential impacts and the extent of impacts to water quality and sensitive species. Smaller geographic and ecological scope has, in turn, subjugated the significant environmental and social impact of the proposed criteria. As a result, there is no apparent need for environmental mitigation or for an environmental preferable alternative. The quality of the draft EIS suffers as these transgressions accrue; only a draft supplemental EIS can remedy these flaws.

39: A comprehensive discussion of this issue is in the end of the next section. Reclamation does not believe that a Supplemental DEIS is required. We have expanded the area of potential effect and revised analyses of water quality and sensitive species impacts. A preferred alternative and environmental commitments are identified in the FEIS. The ROD will discuss the environmentally preferred alternative.

Sincerely,

Kara Gillon
Associate Counsel

William J. Snape III
Vice-President for Law and Litigation

Attachment

11

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

July 13, 2000

Mr. David Hogan
Center for Biological Diversity
P.O. Box 628
Santa Ysabel, California 92070

Dear Mr. Hogan:

This letter is in response to the Center for Biological Diversity request under the Freedom of Information Act (FOIA), dated June 5, 2000, for documents relating to an informal or formal Endangered Species Act (ESA) consultation which may have occurred between the Bureau of Reclamation and the National Marine Fisheries Service (NMFS) with regard to the Department of the Interior's Colorado River Interim Surplus Criteria.

I understand that you spoke with Ms. Deanna Harwood, staff attorney in the Office of General Counsel, National Oceanic and Atmospheric Administration (NOAA) on July 7, 2000. Ms. Harwood and I appreciate your acceptance of our request for additional time in responding to your request. It is our understanding from that conversation that your interest is limited to whether the Bureau of Reclamation had initiated informal or formal ESA consultation with NMFS. As the Bureau of Reclamation has not contacted NMFS regarding informal or formal ESA consultation on the Department of Interior's Colorado River Interim Surplus Criteria, we have no documents responsive to your request.

Although this does not constitute a denial of your request because there were no records available or withheld, you may appeal this determination within 30 days of receipt of this letter. Appeals shall be addressed to the Office of the General Counsel, Room 5882, U.S. Department of Commerce, 14th Street and Constitution Avenue, N.W., Washington, D.C. 20230, and prominently mark your letter and the outside envelope, "FOIA Appeal." Your appeal should state the reasons why you believe this determination was in error. Attach a copy of your original request and a copy of this letter to your appeal.

Sincerely,

Rodney R. McInnis
Acting Regional Administrator

cc: Deanna Harwood

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PACIFIC INSTITUTE
FOR STUDIES IN DEVELOPMENT, ENVIRONMENT, AND SECURITY

September 8, 2000

Regional Director
Lower Colorado Region
Attention: Jayne Harkins (LC-4600)
Bureau of Reclamation
PO Box 61470
Boulder City, Nevada 89006-1470

PS001008
4600

Via fax: (702) 293-8042

Re: Colorado River Interim Surplus Criteria DEIS

Dear Ms. Harkins:

The Pacific Institute for Studies in Development, Environment, and Security respectfully submits the following comments on the Colorado River Interim Surplus Criteria draft Environmental Impact Statement (DEIS). These comments will also be sent to you via regular and electronic mail. The Pacific Institute is an independent, non-partisan, non-profit center in Oakland, California, created in 1987 to conduct research and policy analysis in the areas of environment, sustainable development, and international security. The Institute has actively participated in the development of the Interim Surplus Criteria for more than a year, via formal scoping comments and through informal discussions and workshops. The Pacific Institute also submitted a set of "Environmental Interim Surplus Criteria" for consideration in the DEIS.

The Pacific Institute welcomes the effort to develop interim surplus criteria. We believe that facilitating the implementation of plans and projects to reduce California's use of Colorado River water to its legal apportionment is a worthy objective, and that interim criteria are a reasonable means of achieving this objective. The Institute does not believe, however, that meeting this objective should come at the cost of further harm to the environment.

In the attached comments, the Pacific Institute identifies several major flaws in the DEIS. These include: the failure to analyze the impacts of the 7 State Guidelines (likely to be the preferred alternative); the scope of the document; several of the modeling assumptions; the selection of the 75R trigger as a baseline instead of the flood control trigger; the absence of an adequate cumulative impacts assessment; and a general disregard for the Secretary's responsibility to "protect and enhance the environmental resources of the basin."

The general effect of these deficiencies is to understate the potential environmental impacts of interim surplus criteria. The Pacific Institute concludes that the DEIS is inadequate and should be formally revised and reissued for public comment as a Supplemental Draft Environmental Impact Statement. The deficiencies highlighted in the attached comments are of sufficient magnitude that they preclude a reasonable assessment of the potential environmental impacts associated with the adoption of interim surplus criteria.

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More broadly, the Pacific Institute believes that the potential benefits generated by interim surplus criteria do not warrant their environmental costs. These costs could be substantial. By the year 2015, the flood control alternative would generate a 17% greater probability of flows reaching the delta than would the six states' plan, itself likely to generate more flows than the 7 state plan. Because the frequency and magnitude of such flows are closely tied to the reproduction and health of the native riparian vegetation in the region, and indirectly to the myriad of threatened and endangered species that depend on this habitat, this projected reduction in flows is significant. The projected benefits of the interim surplus criteria are less clear. Interior is promoting the surplus criteria as necessary to reduce California's consumption of Colorado River water. Yet California's plan to reduce its use, even under the most optimistic of projections, would not meet the target conservation objective. And California continues to demand additional water, above and beyond that outlined within the 7 State Plan. At the August 16th AOP meeting, California requested a full surplus declaration for calendar year 2001, including 150,000 acre-feet for agricultural demands, justifying this request as a "transition" into the interim period. The absence of a real "4.4 Plan," combined with California's continued failure to reduce its use, suggest that California will not markedly reduce its use in the next fifteen years. In light of these substantial costs and tentative benefits, there is little incentive to condone increased threats to environmental values along the lower Colorado River.

The Secretary of the Interior has stated that surplus flows must be determined and allocated with *no net loss* of environmental benefits. According to the DEIS, the proxy for the 7 State Plan would likely generate a net loss of such benefits. Reclamation should identify a reasonable mechanism for mitigating the loss of such benefits, whether through the releases suggested by the Environmental Criteria or via another mechanism for protecting environmental benefits.

Overall, the Pacific Institute recommends that Reclamation issue a supplemental DEIS that:
1. defines and assesses the potential environmental impacts of the 7 State Guidelines
2. expands the scope to encompass the limitrophe, the delta in Mexico, and the Upper Gulf
3. revises the modeling assumptions as described in the attached comments
4. uses the flood control alternative as the baseline
5. adequately accounts for cumulative impacts
6. assesses the Environmental Interim Surplus Criteria

Thank you for the opportunity to participate in this important process. Please do not hesitate to contact me if you wish to discuss any of the points made in the attached comments.

Sincerely,

Michael Cohen
Research Associate

enclosure

Pacific Institute Comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

A report of the

PACIFIC INSTITUTE FOR STUDIES IN DEVELOPMENT, ENVIRONMENT AND SECURITY

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OVERVIEW

California currently uses about 18% more Colorado River water than its normal entitlement. Until recently, this excess came from the unused apportionments of Arizona and Nevada, the other two states in the lower Colorado River basin. As Arizona and Nevada continue to increase their own use, the federal government and the other basin states have pressured California to reduce its use down to its legal entitlement. In response, California drafted a plan to reduce its use, but claims that over the next 15 years it will require a reliable supply of additional "surplus" water from the Colorado River to implement this plan. The Department of the Interior and the other basin states have decided that the benefit of implementing California's plan outweighs the risks of increased shortage and other costs associated with drawing down the elevation of Lake Powell and Lake Mead, and so agreed to create temporary rules, known as interim surplus criteria, to allow California to use additional water. Interior claims that this long-term benefit outweighs the potential short-term costs to the environment, such as reduced flows to the Colorado River delta.

The Bureau of Reclamation published a Notice of Intent to develop surplus criteria for Colorado River management on May 18, 1999 (64 Fed Reg 27008). On July 7, 2000, the U.S. Bureau of Reclamation issued a Draft Environmental Impact Statement (DEIS) to analyze the potential environmental impacts of adopting specific interim criteria (65 Fed Reg 42028). On August 8, 2000, Reclamation published a new set of rules, known as the 7 States' proposed interim surplus guidelines (65 Fed Reg 48531).

The adoption of surplus criteria will impact several related Colorado River issues, including the frequency and magnitude of "space-building" and reservoir spill (flood) flows, the availability of water for the delta region, habitat availability and quality for federally listed species, off-stream storage, the lower Colorado River MSCP, the availability of surplus flows to Mexico, recreational uses along Lake Powell and Lake Mead, water quality issues, power generation, the probability of shortage conditions on the river, and others. The Pacific Institute's comments focus on the scope of the DEIS, potential impacts to habitat along the Colorado River downstream of Lake Mohave, modeling assumptions, and several procedural issues.

The Pacific Institute identifies several significant deficiencies in the DEIS:

1 1. **The DEIS does not include the 7 State Plan** The DEIS fails to analyze the potential impacts of the 7 State Plan, which is likely to be the preferred alternative. Comments by various basin state representatives at the August 16th Annual Operating Plan (AOP) meeting in Las Vegas indicated that the basin states already assume that the 7 State Plan will be adopted. Yet the DEIS uses a different plan as a proxy for the 7 State Plan, justifying its decision because a "preliminary review" of this plan suggests that it lies "within the range of alternatives and impacts analyzed in the DEIS." A preliminary review by the Pacific Institute indicates that the new, unanalyzed plan would increase Colorado River depletions, exacerbating the potential impacts relative to the proxy plan and to the baseline. The Pacific Institute recommends that these impacts be modeled and analyzed.

2 2. **Scope** The scope of the DEIS is inadequate. The DEIS does not analyze the full range of potential impacts within the U.S., arbitrarily excluding the limitrophe division of the Colorado River. Additionally, the discussion of transboundary environmental impacts are cursory and

1: Reclamation agrees and has modeled and analyzed the Basin State Alternative for this FEIS. It should be noted that this alternative has been selected as the preferred alternative.

2: The area of potential effect has been expanded to include consideration of the Colorado River 100-year floodplain to the SIB. The Transboundary analysis has been modified in the FEIS and Reclamation believes this section appropriately assesses potential effects in Mexico.

inadequate. The DEIS fails to acknowledge the potential impacts to the Upper Gulf of California, the listed species found there, and the socioeconomic values dependent upon flows to the Gulf. The Pacific Institute recommends that the scope be extended to encompass the estuary at the mouth of the Upper Gulf and the full floodplain in the Colorado River delta.

3. **Modeling Assumptions** The model is based on a series of assumptions that distort the results used to predict potential environmental impacts. These results understate the magnitude of potential impacts to the environmental resources within the affected area. The Pacific Institute recommends that the assumptions be refined, as described in the following.

4. **Baseline** The selection of a liberal baseline, based on the 1997 surplus declaration, rather than the more conservative flood control baseline used for the 1998, 1999, and 2000 surplus declarations, is inappropriate. The use of this arbitrary, liberal baseline diminishes the projected impacts of interim surplus criteria, effectively understating the magnitude the action. The Pacific Institute recommends that the flood control guidelines be used as the baseline.

5. **Cumulative Impacts** The DEIS inadequately accounts for cumulative impacts, and then discounts these impacts, in violation of NEPA. The Pacific Institute recommends that the DEIS list and describe the full range of federal and non-federal actions that impact the affected area, and account for these cumulative impacts.

6. **Environmental Responsibilities** Long term Colorado River system management objectives require the Secretary to "protect and enhance the environmental resources of the basin." The adoption of the interim surplus criteria, particularly the 7 State Plan, would not satisfy this objective. An alternative submitted to Interior by the Pacific Institute and nine environmental organizations would meet both the stated objectives for interim surplus criteria and the Secretary's broader environmental trust responsibilities. The Pacific Institute recommends that Reclamation analyze the potential impacts of this alternative in the DEIS.

The general effect of the above deficiencies is to understate the potential environmental impacts of interim surplus criteria. The Pacific Institute concludes that the DEIS is inadequate and should be formally revised and reissued for public comment as a Supplemental Draft Environmental Impact Statement. The deficiencies highlighted in these comments are of sufficient magnitude that they preclude a reasonable assessment of the potential environmental impacts associated with the adoption of interim surplus criteria.

More broadly, the Pacific Institute believes that the purported benefits generated by interim surplus criteria do not warrant their environmental costs. These costs could be substantial. By the year 2015, the flood control alternative would generate a 17% greater probability of flows reaching the delta than would the six states' plan, itself likely to generate more flows than the 7 state plan. Because the frequency and magnitude of such flows are closely tied to the reproduction and health of the native riparian vegetation in the region, and indirectly to the myriad of threatened and endangered species that depend on this habitat, this projected reduction in flows is significant. The projected benefits of the interim surplus criteria are less clear. Interior is promoting the surplus criteria as necessary to reduce California's consumption of Colorado River water. Yet California's plan to reduce its use, even under the most optimistic of projections, would not meet the target conservation objective. And California continues to demand additional water, above and beyond that outlined within the 7 State Plan. At the August

3: Section 3.16.5.3 has been added to the FEIS to provide information on the general potential impacts that the implementation of interim surplus criteria may have on the frequency of excess flows to Mexico as well as the potential resultant impacts to groundwater recharge and salinity South of the SIB. Reclamation does not concur with the suggestions presented under the headings - "Baseline", "Cumulative Impacts" and "Environmental Responsibilities." Reclamation's rationale for using the analyses criteria and type of analysis presented in the DEIS and FEIS are explained and detailed in these documents. See responses below.

4: See response to Comment 57-11.

5: Section 4.2 has been modified and Reclamation believes that it has appropriately addressed potential cumulative effects of the proposed action.

6: An EIS need not consider an infinite range of alternatives, only reasonable and feasible ones and those reasonably related to the purposes of the project that afford a reasoned choice by the decision maker. The rule of reason shall be utilized in development of a range of alternatives. NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences. For these reasons Reclamation considered the Pacific Institute alternative but eliminated it from further analysis because part of it did not meet the purpose and need of the proposed action and the remainder of the alternative mirrored the Six States Alternative which was analyzed in depth.

7: Reclamation disagrees with the commentor's opinion that the DEIS is inadequate and should be revised and a supplemental DEIS reissued. Reclamation has followed regulations implementing NEPA and it is accepted practice to update, refine, clarify and make factual corrections to the content and analyses in the EIS resulting from improved data control, public comments, coordination with interested parties and incorporate these changes into the document and circulate it as a FEIS.

8: Comment noted. Section 3.16.6 of the FEIS has been expanded to provide more information on the potential effects of changes in excess flows on habitat and threatened or endangered species in Mexico for each of the alternatives.

9: Comment noted. Please refer to the introduction to Volume III regarding the proposed action and its relationship to California's program to reduce its dependence on surplus water.

cont'd

16th AOP meeting, California requested a full surplus declaration for calendar year 2001, including 150,000 acre-feet for agricultural demands, justifying this request as a "transition" into the interim period. The absence of a real "4.4 Plan," combined with California's continued failure to reduce its use, suggest that California will not markedly reduce its use in the next fifteen years. In light of these substantial costs and tentative benefits, there is little incentive to condone increased threats to environmental values along the lower Colorado River.

BACKGROUND

On July 7, 2000, the Bureau of Reclamation released the draft environmental impact statement (DEIS) for the adoption of interim surplus criteria for the Colorado River. These surplus criteria are meant to establish specific guidelines to assist the Secretary of the Interior's determination whether to declare a surplus condition for the river, and to facilitate California's implementation of measures to reduce the state's use of Colorado River water from its current use of about 5.2 million acre-feet[1] (MAF)/year to its legal entitlement of 4.4 MAF.

Under a complex institutional arrangement known as the Law of the River, Arizona, California and Nevada are entitled to use 7.5 MAF of water from the Colorado River each year. Of this amount, California is apportioned 4.4 MAF. Most (3.85 MAF) of the rights to California's water belong to agricultural users, leaving only 0.55 MAF for the 17 million urban users in the greater L.A. and San Diego metropolitan area. Since 1961, California has used an annual average of almost 5.0 MAF, supplementing its entitlement with the unused apportionment of Arizona and Nevada. In recent years, however, Arizona and Nevada have consumed most of their respective apportionments, decreasing the availability of unused water for California.

In the past several years, California has consumed more than 5.2 MAF/year, largely because the Metropolitan Water District of Southern California (MWD) has conveyed nearly 1.2 MAF/year through its Colorado River Aqueduct. The Secretary of the Interior and the other six basin states have pressured California to reduce its demands on Colorado River water down to the state's legal entitlement of 4.4 MAF. In response to these pressures, the state has drafted the California Colorado River Water Use Plan (available at http://crb.water.ca.gov/reports.htm), a loose framework of conservation efforts, groundwater storage, offstream banking, rural-to-urban water transfers, and other programs and projects to meet the agricultural and urban water needs of the state while reducing consumption. Originally, this water use plan was called the "4.4 Plan," but because it only projects 0.49 MAF of savings in the next 15 years and 0.54 MAF of savings in the next 25 years, it was given its longer but less ambitious title.

Partly in response to California's demand for additional water as it drafted the California Plan, and partly because of very high reservoir levels and unusually wet hydrologic conditions, the Secretary declared a surplus for the river each year from 1996 – 2000. Authority for the Secretary to declare a surplus stems from the *Arizona v California* Supreme Court Decree (1964). A surplus condition allows the lower basin states to consume water beyond their normal apportionment of 7.5 MAF. California is entitled to 50% of this surplus, Arizona 46%, and Nevada 4%; a state may also use the another state's unused apportionment. The Secretary

[1] An acre-foot is 325,851 gallons of water, approximately the amount two families of four use in a year. The estimated annual flow of the Colorado River since 1906 is about 15 MAF.

declared these surpluses through the Annual Operating Plan (AOP) process, with the assistance of representatives of the seven Colorado River basin states (Arizona, California, and Nevada in the Lower Basin and Colorado, New Mexico, Utah, and Wyoming in the Upper Basin), tribal representatives, water users, members of the academic and scientific communities, environmental organizations, contractors for hydroelectric power, and the general public.

PARTICIPATION OF THE PACIFIC INSTITUTE

On June 28, 1999, the Pacific Institute submitted comments on the scope of the National Environmental Protection Act (NEPA) process and the DEIS, urging the inclusion of an assessment of transboundary impacts, among other concerns. In November 1999, Pacific Institute staff met with a senior Reclamation official to discuss our concerns regarding the potential environmental impacts of interim surplus criteria. As a result of this conversation, the Institute coordinated a meeting in Las Vegas on December 16th between representatives of several environmental groups and senior Reclamation staff. Among the concerns voiced at the meeting was the potential for surplus criteria to lower the elevation of Lake Mead, decreasing the frequency and magnitude of the space-building and flood release flows that sustain native riparian habitat along the lower Colorado River, especially in the river's delta in Mexico. Upon Reclamation's request, the Pacific Institute offered to draft a set of interim surplus criteria that reflected the interests and concerns of the environmental community. 10

In response to the concerns voiced by environmental groups at the meeting, the Secretary of the Interior added language to his keynote address on December 17, 1999 to the Colorado River Water Users Association conference. The Secretary stated that surpluses must be determined and allocated with *no net loss* of environmental benefits (emphasis added), setting an important environmental baseline for interim surplus criteria. The Pacific Institute incorporated the Secretary's environmental baseline into the "Environmental Interim Surplus Criteria for the Colorado River" (DEIS Attachment F) that was drafted jointly with American Rivers, Defenders of Wildlife, Environmental Defense, Friends of Arizona Rivers, Grand Canyon Institute, Grand Canyon Trust, Land and Water Fund of the Rockies, Sierra Club Colorado River Task Force, and the Sonoran Institute, as well as several members of the academic community. These criteria were designed to satisfy the dual objectives of improving the predictability of surplus conditions for water users and facilitating California's reduction in the use of Colorado River water, without causing further harm to the environment. In effect, they integrated mitigation measures into the criteria themselves.

INTERIOR AND THE DELTA

The Department of the Interior has publicly recognized the importance of the Colorado River delta. The Secretary's keynote address reflected this recognition. On May 5, at the Law of the Colorado River conference in Tucson, the Deputy Secretary said that the delta is an issue whose time has come. Less than two weeks later, Interior and its counterpart agency in Mexico, SEMARNAP, signed the Joint Declaration to Enhance Cooperation in the Colorado River Delta. In the Joint Declaration, Interior pledges to "strengthen cooperative action and mechanisms, to improve and conserve the natural and cultural resources of the Colorado River Delta, including the river and associate wetland habitats," and "develop strategies of environmental sustainability," among other actions.

10: Comment noted.

In a opinion piece that appeared in the *Los Angeles Times* on August 25th, the Deputy Secretary wrote of the CALFED process that

> It's also about restoring the watersheds that have borne the effects of water manipulations that were undertaken in a different era, an era that paid little regard to the impact that damming, depleting or diverting rivers and streams would have on downstream water quality, fish and wildlife resources and other environmental values.

These words could have been written about the Colorado River. Yet, while the CALFED plan recognizes and allocates water for environmental needs, the interim surplus criteria do not.

The Colorado River Delta

Historically, prior to the construction of dams, diversions, and other reclamation projects, millions of acre-feet of Colorado River water flowed every year through the Colorado River delta and into the Upper Gulf of California, supporting tremendous levels of biological productivity and diversity. The delta has been degraded as human demands have dramatically reduced the amount of water reaching it. Except for years with unusually high run-off, virtually the entire flow of the Colorado is now captured and used before reaching the river's mouth. However, even without the historic flows, the remnants of the delta and Upper Gulf still comprise the largest and most critical desert wetland in North America, as well as one of the world's most diverse and productive marine ecosystems. In recent years, flood release flows from upstream dams have prompted the re-emergence of ecologically valuable riparian habitat and have been strongly correlated with a rise in the shrimp catch in the Upper Gulf, an indication of the renewed viability of an important estuary. In 1993, Mexico affirmed the importance of the region and designated it a Biosphere Reserve, which has since received international recognition.

11 At its upper reaches, the delta is dominated by native vegetation such as cottonwoods and willows, offering more than twice the amount of native riparian habitat found in the entire reach of the Colorado River in the United States from Hoover Dam to the Mexican border. The native riparian vegetation of the lower Colorado River and the delta evolved in response to occasional flood events; such flows must be replicated to ensure the continued viability of these species. The middle extent of the delta contains extensive backwaters filled by occasional floods, providing valuable wetland habitat for migratory birds as well as a myriad of local species. The delta supports several species listed by the U.S. Fish & Wildlife Service, including southwestern willow flycatchers (*Empidonax traillii extimus*), Yuma clapper rails (*Rallus longirostris yumanensis*), totoaba (*Totoaba macdonaldi*) and desert pupfish (*Cyprinodon macularius*), while the river's estuary is home to the vaquita porpoise (*Phocoena sinus*), the world's most endangered marine mammal.

12 Currently, the Colorado River delta is largely dependent on flood control releases from Hoover Dam. These waters are released primarily from October through February, to provide flood control storage space. It is important to distinguish between surplus flows, which are released upon declaration of a "surplus condition" in response to the diversion orders of downstream users, and flood flows. Army Corps of Engineers guidelines dictate the release of water from Hoover Dam from August through December to ensure sufficient flood control storage capacity. These releases are known as "space building releases," while releases made after January 1 to ensure sufficient flood control storage capacity are known as "flood control releases." Both are also referred to as "spills." These flows may be diverted by downstream users. It is important to note that the current timing of flood control releases precedes the natural flood regime and

11: See response to Comment 22-8.

12: See Sections 1.3.6 and 3.3.1.2 for explanations of flood control operations for Lake Mead (Hoover Dam).

cont'd therefore offers less benefit for the successful recruitment of native riparian vegetation such as cottonwoods and willows than if these releases more closely mimicked the river's natural flood regime.

THE DEIS

POTENTIAL AFFECTED AREA

13 The DEIS notes the requirement to assess transboundary impacts, pursuant to Executive Order 12114 and the Council on Environmental Quality Guidelines on NEPA Analyses for Transboundary Impacts, as well as the regulations implementing Endangered Species Act consultations with the Fish and Wildlife Service and the National Marine Fisheries Service. Yet the DEIS states that the potential area of impact extends downstream only as far as the Northerly International Boundary (NIB) (p. 3.2-1). This is inconsistent with the Lower Colorado River Multi-Species Conservation Program (MSCP) planning area, which extends as far south as the Southerly International Boundary (SIB), 23 miles further south. It is also inconsistent with the controlling legal authority noted above. Ironically, Map 3.2-1 of the DEIS identifies the "Area of Potential Effect" as extending below the NIB, below the SIB, as far downstream as the river's mouth at the Gulf of California.

The geographic scope of the DEIS should be broadened as well as lengthened. Below Morelos Dam, the river's floodplain widens toward the south. The entire region within the levees in Mexico should be included as the potentially impacted area, as releases of sufficient magnitude to cause overbank flooding could potentially inundate much or all of this area; the 100-year floodplain is much broader in the delta than it is upstream. The DEIS should list the size of the affected area for each of the reaches of the river examined and include specific vegetation coverages for each area. Much of this information has been compiled for the MSCP for the U.S. reach of the river, and has also been documented for the Mexican region.[2]

14 Historically, the Colorado River emptied into the upper Gulf of California, creating one of the world's most productive estuaries. As a result of flood control releases in the mid-1980s and again starting in 1997, water again flows into the upper Gulf. These flows generate measurable ecological and economic benefits. Such benefits would be negatively impacted by the projected reductions in flows due to the implementation of surplus criteria. These impacts should be analyzed in the supplemental DEIS.

15 The letter (in Attachment Q) from Arturo Herrera, Commissioner of the Mexican counterpart to the US State Department's IBWC, highlights several other potential impacts resulting from the implementation of surplus criteria, including reduced recharge of the Mexicali aquifer. Annual overdraft of the aquifer is partly offset at present by infiltration from periodic Colorado River flood flows. Absent this periodic recharge, the level of the water table would drop more rapidly, increasing the hydrologic gradient under the border and drawing groundwater from the U.S. Such indirect impacts extend the area of potential effect and should be analyzed as part of the

[2] See Daniel F. Luecke et al. 1999. *A Delta Once More: Restoring Riparian and Wetland Habitat in the Colorado River Delta*. Washington, DC: Environmental Defense Fund Publications, pp. 20-29.

13: Potential effects on special-status species within the expanded area of potential effect are addressed Section 3.8 of the FEIS. Map 3.2-1 has been revised to more accurately represent the area of potential effect considered within the U.S. as well as areas within Mexico that are addressed in Section 3.16, Transboundary Impacts.

14: See response to Comment 12-8.

15: Reclamation believes that the analysis presented in this section. Section 3.16, Transboundary Impacts, has been modified for the FEIS and adequately and appropriately identifies potential effects of interim surplus criteria in Mexico. Note that Reclamation is committed to working with Mexico to address specific concerns.

NEPA process. Commissioner Herrera also underscores the potential environmental impacts on the delta resulting from surplus criteria.[3]

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Reclamation dismisses Commissioner Herrera's concerns by stating that "it is not clear that these concerns are a result of interim surplus criteria" (3.16-3). Dismissing these concerns violates the spirit of consultation with Mexico. And, as noted in the DEIS, the selected alternative will alter the frequency and magnitude of flood flows reaching Mexico, indicating that such concerns are in fact real. The supplemental DEIS should extend the area of potential impacts to encompass the full range of potential impacts to the delta region and the Upper Gulf of California, as well as regions indirectly impacted due to reduced recharge of the Mexicali aquifer and the likely increase in transboundary groundwater flows due to increased pumping in Mexico.

DEIS AND HABITAT

16 The DEIS fails to provide an adequate description of the habitat and species composition present along the lower Colorado River in the U.S. and in Mexico below Morelos Dam. The DEIS should provide a map displaying the various vegetation coverages along the river downstream of Mohave Dam, to reflect riparian and wetland habitat present in the various wildlife refuges along the river and within the delta in Mexico. The minimum stage necessary to freshen backwaters along the mainstem of the river and to inundate the floodplain in Mexico should be indicated on the map, along with a projected frequency interval at which these conditions would be satisfied under the different alternatives under consideration. The DEIS offers only generalized information and aggregated acreage estimates, despite the fact that more refined data exist.[4]

17 The DEIS does not address the significant difference in the quantity and frequency of water reaching the delta that the model projects for the flood control alternatives and the Six States' Plan. Table 3.16-1 indicates that, in the year 2015, the probability of flood flows reaching the delta is more than 16 percent greater under the flood control alternatives than under the Six States' Plan. The reduced frequency of flows to the affected area under the Six States Plan would cause further harm to habitat in the area, subsequently impacting the species that depend on this habitat. The DEIS should analyze these impacts.

18 Section 3.16.6.1 states that reductions in flows below the NIB were instituted through the 1944 Treaty. This statement is incorrect and is likely not what was intended. The Treaty establishes minimum, not maximum, flows. In fact, the Treaty increased the quantity of flows that the U.S. was prepared to deliver to Mexico.[5] The responsibility for the dramatic reductions in the flow of the Colorado River to its delta, from historic levels of roughly 14 MAF/year to zero in most years, lies with U.S. interests.

CUMULATIVE IMPACTS

19 NEPA requires a cumulative impacts analysis: the cumulative impacts of surplus criteria atop increased upper basin consumption and continued excessive use by California, among other

[3] Note that "alamos" in the Commissioner's letter is correctly translated as "cottonwoods."
[4] See Daniel F. Luecke et al. 1999. *A Delta Once More*, pp. 20-29.
[5] Norris Hundley, jr. 1966. *Dividing the Waters: A Century of Controversy between the United States and Mexico*. Los Angeles: University of California Press.

16: Potential effects on special-status species within the river corridor between Hoover Dam and the SIB are addressed in the BA for ISC/SIAs and have been summarized in Section 3.8 of the FEIS.

17: The EIS discusses these potential effects as necessary to identify the differences between each of the alternatives compared to baseline conditions. Table 3.16-1 has been updated in the FEIS with revised data.

18: Comment noted. Section 3.16.6.1 has been revised to state that "...reductions have been instituted while meeting the requirements of an international treaty and the diversion and use of such treaty water is solely at Mexico's discretion." At least since execution of the Treaty, it is incorrect to state that responsibility for reductions of flows to Colorado River delta lies with U.S. interests alone.

19: See response to Comment 12-5.

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actions, can not be dismissed. The DEIS provides less than a page on cumulative impacts (4.2). The cumulative impacts analysis should list and describe all of the federal and non-federal actions that could impact the affected area, including reasonably foreseeable future actions. These listed impacts should then be analyzed in light of the additional incremental impacts posed by the surplus criteria. The DEIS dismisses the potential incremental impacts due to the selection of a preferred set of surplus criteria, stating that "the potential effects of interim surplus criteria are likely to be negligible ..." relative to other actions. This is not an adequate cumulative impacts analysis.

PACIFIC INSTITUTE PROPOSAL

20

The "Environmental Interim Surplus Criteria," submitted by ten NGOs and subsequently endorsed by the Center for Biological Diversity and The Wilderness Society, should be analyzed in a supplemental DEIS. These criteria would satisfy the objective of facilitating California's reduction in its use of Colorado River water, without forcing the environment to bear the costs of such actions. Although similar in many respects to the Six States Plan, the Environmental Criteria differ sufficiently to merit appraisal in a supplemental DEIS.

21

In the following, and per previous conversations and correspondence with Reclamation staff, we offer suggestions as to how best to model the Environmental Interim Surplus Criteria, and suggest several specific projections that should be included in the supplemental DEIS.

Clarifications:

- Reclamation should model the monthly release schedule under "2) baseline delta flows" so that these delta flows are relatively constant throughout the year
- Reclamation should model the monthly release schedule under "3) delta flood flows" so that 100% of such releases are made from May through July, peaking in June at a rate of 35%: 45%: 20% (flows in other months would be released by the baseline flow trigger, above)
- Due to difficulties in modeling a Secretarial determination of "No Net Loss," for the purposes of modeling Reclamation should assume that such a determination is made

Differences between the Environmental Criteria ("NGO") and the 7 States' Plan ("States"):

- **Normal elevation trigger**: ≤ 1120.4 for NGO, ≤ 1125 for States
- **Baseline delta flows** 0.032 MAF above elevation 1120.4 for NGO; none for States
- **Partial M&I/Domestic surplus elevation** triggered between 1125 & 1145 for both; for purposes of these modeling runs, the quantities of water released under the two plans are equivalent
- **Full M&I/Domestic Surplus** triggered above elevation 1145. NGO plan equivalent to States' plan with the following exceptions: Total deliveries through the Colorado River Aqueduct would be limited to 1.212 million acre-feet under the NGO plan instead of 1.250 under the States' plan
- **Delta Flood Flows** triggered by Reclamation 70 percent flood control avoidance elevation (70A1) under the NGO plan; no such release under the States'

20: See responses to Comment 11-8 and 13-4.

21: Reclamation has noted the clarifications of the Pacific Institute's proposed interim surplus criteria, and the recital of differences between its proposal and the Seven States Proposal. The revised provisions of Pacific Institute's plan have been included in Attachment F of the FEIS entitled Surplus Criteria Proposal by Pacific Institute.

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- **Full Surplus/Quantified Surplus** 70R trigger for both plans, although for the purposes of determining the trigger elevation the NGO plan considers the above delta baseline and flood flows as "uses" and the States plan does not (so the trigger elevation will be higher under the NGO plan). Unlike the States' plan, under the NGO plan, no water would be made available to California or Nevada for off-stream storage, including groundwater banking, under this tier, and no surplus water would be made available to Arizona for such purposes under this tier.
- **Flood Control Surplus** equivalent for the two plans
- **Shortage Criteria** the NGO plan does not establish shortage criteria

Requested information:

22

- Probabilities of shortage under the two plans, using the States' definition of shortage
- Probabilities of delta flood flow releases over time
- Probabilities and projected quantities of flows below all major diversions, under the two plans
- Probabilities and projected quantities of flow released under Partial M&I/Domestic surplus, under the two plans, until year 2016

22: Comment noted.

23

The DEIS states that "the delivery of water to or through Mexico would require modification of the Treaty" (2-3). This is incorrect. The Treaty requires the U.S. to deliver a minimum quantity of flows to Mexico; it does not limit the amount of water the U.S. may deliver. In 1998, the U.S. delivered more than 3.0 MAF over Treaty obligations; in 1984, the U.S. delivered more than 13.8 MAF over Treaty obligations. The development and implementation of interim surplus criteria are subject not only to the demands of California and the basin states, but to the Law of the River and the laws of the United States, including NEPA and the ESA. Within this broader context, the proposed environmental surplus criteria are appropriate. Reclamation and the basin states will likely come to find that the limited dedication of resources for environmental purposes outlined in the environmental criteria are far more benign than the mitigation that will be required should they choose to ignore environmental impacts in the U.S. and Mexico.

23: See response to Comment 18.

Modeling

The adoption of interim surplus criteria would create a new set of operational instructions for managing the river; it would not require the construction of new infrastructure. The direct environmental impacts of such criteria would be limited to the effects of changes in river operation. To project the potential impacts of such changes, Reclamation created a basin-wide model that uses the historical record (since 1906) of Colorado River flows to predict future inflows to the system and releases from Lake Mead. As noted by Reclamation, the results of the model are most sensitive to projections of future inflows, the least reliable data. The accuracy of the model also decreases the further it projects into the future. Reclamation contends that the main value of the model is that it allows for an analysis of the relative impacts between the proposed alternatives, rather than an analysis of the absolute impacts of any one alternative.

These comments address three general aspects of the model: the assumptions common to all alternatives, the assumptions for specific alternatives, and the presentation of the model results. There are five assumptions common to all alternatives that should be refined:

24

1. **Inflows** Even over the brief historical record, the yearly natural flow of the Colorado River has varied dramatically, ranging from an estimated low of 5.0 MAF in 1977 to an estimated high of 23.6 MAF seven years later. It is not clear that the Index Sequential Method (ISM) used in the model captures the full range of future variability, particularly for the brief 15 year duration of the surplus criteria. We suggest using a partially random model, one that inputs all of the possible permutations of the historical record, to increase the range of possible flows during the interim period.

25

2. **Upper Basin Consumption** The model uses 1996 projections of upper basin consumptive use. These projections reflect a maximum probable rate of increase. As noted by Reclamation at its Hydrological Modeling meeting (8/15/2000), upper basin diversions (and consumptive use) are subject to flow variability because many of them are run of the river diversions, rather than diversions from stable reservoirs, decreasing the likelihood that diversions will match projected demand. The model should incorporate most probable and minimum probable rates of increase for upper basin consumptive use, and Reclamation should assess the sensitivity of the results to differences in such projections. Such rates of increase affect the quantity of inflows to Lake Mead and therefore projections of Mead elevation, important for projecting flood releases flows, shoreline impacts, and probabilities of shortage conditions.

26

3. **Initial Mead Elevation** The model uses as a starting condition the elevation of Lake Mead on January 1, 2000. To improve the accuracy of the model, we recommend that this starting elevation be changed to reflect the projected Mead elevation on December 31, 2000, currently expected to be about thirteen feet lower than the previous year's elevation due to lower than average inflows. This significant drop in elevation will decrease the probability of water reaching the delta region.

27

4. **Deliveries at NIB** The DEIS notes that the U.S. delivers approximately 0.14 MAF/year to Mexico at a location one mile east of the river at the SIB. Yet the model assumes that this delivery occurs 23 miles north, within the river channel. The model should be refined to account for the different delivery points, the fact that the SIB delivery is not made within the river channel, and the fact that the SIB deliveries are return flows from Arizona and not mainstem water. This modeling assumption distorts projected flows through the limitrophe and further downstream, and also distorts projections of maximum probable diversion by Mexico through its Alamo Canal at Morelos Dam.

28

5. **Yuma Desalting Plant** The model assumes that the Yuma Desalting Plant will be operational in the year 2015, yet fails to account for the impacts such an action would have on the Cienega de Santa Clara. The Cienega currently relies on agricultural drainage flows that bypass the desalting plant; operation of the plant would not only markedly decrease the quantity of flows to the Cienega but would also markedly decrease the quality of the water sent to the wetlands, destroying habitat of special status species such as the Yuma Clapper Rail and Desert Pupfish. The DEIS should explain why it assumes operation of the Plant in 2015 and should not ignore the environmental impacts of such an action. Alternatively, and more appropriately, the DEIS should not assume operation of the plant until the appropriate environmental documentation has been completed.

24: See the response to Comment No. 31-8 for a discussion of the Index Sequential Method. Other methods are possible, and Reclamation is evaluating them for future use.

25: See response to Comment No. 14-10 for information regarding depletion schedules used in the FEIS.

26: The projected Lake Mead elevation on January 1, 2002 was used for the initial condition in FEIS modeling. See response to Comment No. 13-22 for further discussion.

27: The following excerpt will be added to Section 3.4.3.6 to address the Mexico water supply delivery requirements under Minute 242: Minute 242 provides, in part, that United States will deliver to Mexico approximately 1,360,000 acre-feet (1,677,545,000 cubic meters) annually upstream of Morelos Dam and approximately 140,000 acre-feet (172,689,000 cubic meters) annually on the land boundary at San Luis and in the limitrophe section of the Colorado River downstream from Morelos Dam. It should be noted that while a portion of Mexico's 1.5 maf annual apportionment is actually delivered below Morelos Dam, the entire delivery to Mexico was modeled at Morelos Dam. This basic assumption, while different than actual practice, served to simplify and facilitate the analysis of water deliveries to Mexico under the baseline conditions and surplus alternatives.

28: See response to Comment No. 11-14 for a discussion of the FEIS assumption that the Yuma Desalination Plant will begin operations after 2022.

29 6. **Climate Change** For the purpose of increasing the accuracy of longer-term projections, the model should incorporate the range of potential impacts of climate change on the Colorado River basin, which might reduce inflows by as much as 20 percent.[6]

The assumptions behind the various alternatives differ in some respects. These varying assumptions inform the projections of the alternatives' relative impacts. The DEIS bases much of its analysis on the relative difference in flows under the different alternatives, making the assumptions behind these alternatives especially important. Reclamation should clarify the following points:

30 1. **Baseline** NEPA requires consideration of a "no action" alternative, to serve as a baseline for comparison. To date, no formal surplus criteria exist to act as such a baseline. The Secretary, acting without formal guidelines or criteria, has declared a surplus condition for the river each year starting in 1996. Hydrologic conditions have varied considerably over the five years in which surplus has been declared, to the extent that in 1996 insufficient volume was deemed available to provide surplus for Mexico, while in 1998 more than 3.0 MAF were released above downstream demands. Reclamation determined that a "75R" strategy offered the best approximation of conditions on the river at the time of the Secretary's declaration in 1997. The DEIS fails to explain why Reclamation selected 1997 as the baseline year. Selecting 1996 as the baseline would have generated a much more liberal definition of surplus, while selecting the years 1998-2000 would have matched a flood-control definition of surplus (2.2.1.4). Reclamation should explain why it used a single year as the model for the baseline condition, rather than the three years that followed. Although not markedly different than the 75R baseline, a flood-control baseline would generate a greater frequency and magnitude of flows to the delta than the 75R baseline and a 16.7% greater chance of flood flows than the Six States alternative in 2015.

2. **California Consumptive Use** As shown in DEIS Attachment G, the 75R baseline and the flood control alternatives assume that California will only consume roughly 4.4 MAF/year. In comparison, the six states' plan assumes California will consume more than 5.2 MAF at full surplus, and 5.0 MAF decreasing to 4.7 MAF at the Level 2 surplus tier. Yet the main impetus for the creation of interim surplus criteria is to reduce California's use to 4.4 MAF/year. If California were only consuming 4.4 MAF/year, as assumed by the baseline, there would be no need for interim surplus criteria. It is inconceivable that California will reduce its use by more than 0.8 MAF in one year. The baseline/"no action" alternative therefore does not accurately reflect actual conditions.

31 3. **Six vs. 7 State Plan** The 7 State Plan is the consensus approach submitted by the Colorado River Basin states and therefore will very likely be the preferred alternative. Reclamation claims that the 7 State Plan (65 Fed Reg 48531) is substantially similar to the Six State Plan that is analyzed in the DEIS, and that it does not require its own analysis. The differences between the two plans therefore demand scrutiny, to assess whether the DEIS analysis of the Six State Plan is a reasonable proxy for what is likely to be the preferred alternative. The

[6] See L. Nash and P. Gleick, 1991, The sensitivity of streamflow in the Colorado basin to climatic changes, *Journal of Hydrology* 125: 221-241 and L. Nash and P. Gleick, 1993, The Colorado River Basin and Climatic Change: The Sensitivity of Streamflow and Water Supply to Variations in Temperature and Precipitation, Washington, DC: US EPA, EPA230-R-93-009, 121 pp.

29: There is not yet a consensus in the scientific community regarding whether long-term climate change will result in overall wetting or drying of the Colorodo River Basin. The use of the Index Sequential Method captures a wide range of flow conditions that enables the evaluation of future water supply conditions under different hydrologic scenarios. See the response to Comment No. 31-8 for a discussion of the Index Sequential Method.

30: Reclamation did not use only a single year as the basis for the baseline in the DEIS. See the response to Comment 57-11 for an explanation of the derivation of the baseline.

31: Reclamation's statement that the Seven States Proposal was substantially similar to the Six States Alternative was a conclusion about the need for a preliminary analysis to accompany the DEIS. The preferred alternative has been derived from the Seven States draft proposal, and has been analyzed in this FEIS at the same degree of detail as the other alternatives.

cont'd

following simplified table depicts specific differences between the two plans in their prescribed surplus deliveries to California:

Surplus Tier	Six States	7 States
Partial M&I for MWD	0.304 MAF[7], less new transfers	0.262 MAF
Full M&I for MWD	0.554 MAF[7], less new transfers	0.700 MAF

There are also programmatic differences between the two plans. The 7 State Plan is likely to increase consumptive use by California, further decreasing the elevation of Lake Mead and further decreasing the frequency and magnitude of excess flows reaching the delta and Upper Gulf.

The data generated by the model should be presented in a clear manner that conveys pertinent information to the reader. Model results should be refined as follows:

32

1. **Annual Scale** Much of the specific data in the DEIS is presented only for the years 2005, 2015, 2025, and 2050, providing only two data points for the interim period. At a minimum, the DEIS should present actual data for 1999 as a historical reference, and then project flows for the years 2000, 2005, 2010, and 2015, in addition to the longer-range projections, to provide the reader with a more precise understanding of the potential impacts of the various alternatives.

33

2. **Seasonal Scale** The DEIS projects monthly releases as proxies for seasonal flows to the delta. However, the months selected to represent seasonal flows (January, April, July, and October) do not reflect maximum discharge rates. The maximum quantity of flows to the delta in 1997, for example, occurred in the months of February, August, and September. Months should be selected based on their ability to represent maximum and minimum flows to the delta.

34

3. **Instantaneous Discharge** To provide a more accurate picture of transboundary impacts, the model should be adjusted to project instantaneous releases. Such discharge rates can be readily converted to river stage, allowing for an assessment of the potential to freshen backwaters in the U.S. and inundate the floodplain in Mexico below Morelos Dam. Both of these actions are critical for protecting and enhancing existing wetland and riparian habitat. Additionally, the DEIS states that uncertainty about water use in Mexico challenges efforts to predict potential effects of transboundary flows. The Pacific Institute agrees that it is reasonable to assume that Mexico will continue to maximize its consumptive use of Colorado River water. This use could be predicted by comparing the conveyance capacity of the Alamo Canal with instantaneous flow rates above Morelos Dam (effectively a run of the river diversion).

35

4. **Figures** The DEIS should clearly indicate the differences between the various alternatives under consideration. Many of these differences are slight and tend to be lost at the resolution displayed in the graphs in the DEIS. Figures 3.3-21a-d, for example, would benefit from limiting the x-axis to those values between 75% and 100%, which would enable the reader to draw a better distinction between the alternatives. Additionally, the DEIS incorrectly claims that the highest frequency of flows to the delta is expected to occur under the Six States

[7] Includes 0.108 MAF IID-MWD transfer (1999 level).

32: Figures and text were provided in the various sections of the DEIS and FEIS that describe current and historical conditions, many on an annual basis.

33: See response to Comment No. 13-27 for a discussion of seasonal analyses.

34: See response to Comment No. 13-28 for a discussion of model time steps.

35: Comment noted. All tables and figures have been updated to reflect data modeled for FEIS, and have been made more readable. The incorrect statement regarding frequency of flows to Mexico being greater for the baseline and flood control alternatives has been corrected.

Alternative (3.3-44). As shown in Figs. 3-3-21a-d, both the baseline and flood control alternatives would generate more frequent flows to the delta than the Six States Alternative.

7 State Plan

The DEIS does not analyze the 7 State Plan, so its potential impacts can only be estimated from the projections for the Six State Plan. Beyond this failure to satisfy NEPA guidelines, there are several shortcomings associated with the 7 State Plan itself. Chief among these is that it does not require that California reduce its use from current levels of roughly 5.2 MAF/year to the state's legal entitlement of 4.4 MAF/year, a reduction of 0.8 MAF/year. Instead, the 7 State Plan states that California expects to implement projects generating 0.38 MAF of savings by 2011, 0.49 MAF of savings by 2016, and 0.54 MAF of savings by 2026, though it fails to provide a baseline for measuring such savings. Absent such a prescribed baseline, we assume that the savings will be measured against current levels of consumption. Yet this suggests that California will fall far short of the 4.4 MAF objective that is being promoted as the rationale for accepting greater depletions of Colorado River water and further harm to the environment. 36

The long-term Colorado River system management objectives require the Secretary to protect and enhance the environmental resources of the basin. Yet clause III.3.(f) of the 7 State Plan would preclude releases of water for any purposes other than those outlined in the Plan, including potential releases for the Lower Colorado River MSCP or releases to the Colorado River delta. This clause of the 7 State Plan is invalid and should be deleted. The *Arizona v. California* Decree (1964) established the Secretary of the Interior as River master and vested in him federal control of the Lower Colorado River. The states lack the legal authority to prohibit releases for other purposes.

Secretarial Discretion

Allocation of surplus water, over and above the basic lower basin apportionment, is a discretionary function of the Secretary that can and should be exercised consistent with other responsibilities incumbent upon him for allocating the benefits of the river, planning its use, and protecting its resources. Past decisions on development, basic allocations, and operations were made before most of those other responsibilities had been articulated under laws and policies of the United States. This has resulted in serious environmental harm. Given this situation, the Secretary can and should use his discretion in this more enlightened era to the maximum extent possible to ensure that his decisions result in no further harm and, wherever possible, in an improvement of environmental quality. 37

Environmental needs must be met before any quantity of discretionary water is dedicated to consumptive uses. Until then it is not truly "surplus." Environmental losses were perhaps unfortunate consequences of the basic allocations embedded in the Law of the River and related development; but they need not be perpetuated when the Secretary has discretion over whether and when to allocate additional water. The Secretary recognized as much when he insisted that the surpluses must be determined and allocated with no net loss of environmental benefits.

36: The Seven States Proposal is identified as the Basin States Alternative/Preferred Alternative in the FEIS. The Basin States Alternative has been evaluated in this FEIS. Several particular sections of the Basin States Alternative, including III.3.(f) have not been incorporated in the Basin StatesAlternative/Preferred Alternative.

37: The Secretary, under the powers vested by Congress in Section 5 of the BCPA, as confirmed by Section II(B)(2)of the 1964 Decree, has certain discretionary authority to determine whether any year is a surplus, normal or shortage year. When more than 7.5 maf of Colorado River water is available for consumptive use during a calendar year in the three lower Division States, this is a surplus determination. Pursuant to the Decree II(B)(2), if sufficient mainstream water is available for release to satisfy annual consumptive use in excess of 7.5 maf, such excess consumptive use is surplus, and 50 percent shall be apportioned for use in California, 46 percent apportioned for use in Arizona, and 4 percent for use in Nevada. When making a surplus determination, the Secretary must apply the criteria in the Long-Range Operating Criteria (Section 602 of P.L. 90-537) in development of the Annual Operating Plan.

SocioEconomic Impacts

38 The DEIS fails to address the potential socioeconomic impacts of interim surplus criteria. The few remaining Cucapá living in the affected area, who traditionally subsisted on Colorado River fish and endemic grains, depend on Colorado River flows.[8] Decreasing the frequency and magnitude of these flows will negatively impact the Cucapá. Additionally, Colorado River flows are correlated with improved yields in the shrimp and fish harvests in the Upper Gulf of California,[9] a major source of employment in the area.[10] The reduced frequency and magnitude of such flows due to the sole and cumulative impacts of surplus criteria will have negative economic repercussions on fishermen and others in the affected area. These impacts should be assessed as part of the DEIS.

Conclusion

The Pacific Institute concludes that the DEIS is inadequate and should be formally revised and reissued for public comment as a Supplemental Draft Environmental Impact Statement. The deficiencies highlighted in these comments are of sufficient magnitude that they preclude a reasonable assessment of the potential environmental impacts associated with the adoption of interim surplus criteria.

[8] Daniel F. Luecke et al. 1999. *A Delta Once More*. pp. 7-8.
[9] Manuel S. Galindo-Bect et al. 2000. Penaeid shrimp landings in the upper Gulf of California in relation to Colorado River freshwater discharge. *Fisheries Bulletin* 98:222-225.
[10] Jason Morrison et al. 1996. *The Sustainable Use of Water in the Lower Colorado River Basin*. Oakland, CA: Pacific Institute for Studies in Development, Environment, and Security. p. 23.

38: The DEIS and FEIS include a section on "Environmental Justice" (3.15) for purposes of addressing potential economic and social impacts on minority and low-income populations. Executive Order 12898 establishes the achievement of environmental justice as a priority, but this direction is specific to minority and low-income populations in the United States. No socio-economic effects are anticipated due to implemnation of any of the interim surplus alternatives. In addition, the transboundary impacts section of the EIS, which addresses impacts to natural resources on Mexico, does not anticipate any adverse effects to sensitive biological resources along the river in Mexico. This includes potential impacts to commercial or subsistence harvesting of shrimp, fish or crops in Mexico.

September 8, 2000

Regional Director
Lower Colorado Region
Attention: Jayne Harkins (LC-4600)
Bureau of Reclamation
PO Box 61470
Boulder City, Nevada 89006-1470

RE: Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

Dear Jayne,

Southwest Rivers appreciates the opportunity to comment on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement (DEIS) developed by the Bureau of Reclamation. Southwest Rivers is a newly formed non-profit organization with a mission to protect and restore the river ecosystems of the Colorado River basin. Established by the staff and directors of other conservation organizations active in the Colorado River basin, Southwest Rivers is focused on the long-term health of the riverine ecosystems of the Colorado River watershed.

1 Southwest Rivers joins several other environmental groups in expressing substantial concerns about the impact of the proposed action on the Colorado River ecosystem. (We support the comments filed by the Pacific Institute for Studies in Development, Environment and Security, as well as those filed by the Defenders of Wildlife, et al.) Although the Department of the Interior and the Colorado River basin states have decided that the benefit of implementing California's plan to reduce its use of Colorado River water downstream its legal entitlement is of paramount importance in the Colorado River system, we cannot agree. We are supportive of efforts to reduce California's use, but not at the expense of Colorado River ecosystems. California claims that availability of surplus water over the next 15 years is essential to the success of its plan. But since the long-term effects of reducing California's use are unlikely to provide any significant environmental benefits, since California currently relies on unused apportionments to provide the additional water used which in the future would then be used by other states, the short-term environmental costs of this proposed action are an unacceptable price

2 to pay. We believe that there must be some element to the action that provides a benefit to the environment which counteracts the potential costs.

The DEIS as published is deficient in a number of ways. As it stands, it contains enough inadequacies, inaccuracies and omissions that it is incomplete for purposes of meaningful public review. Southwest Rivers recommends that a supplemental draft be prepared and distributed for comment prior to the preparation and release of a final environmental impact statement.

I. The DEIS Omits Material Essential for an Analysis of the Proposed Action

Southwest Rivers has identified a number of elements that are material to an analysis of the proposed action which have not been included in the DEIS.

1: Comment Noted.

2: Comment Noted.

A. The 7 State Plan must be included and analyzed in a DEIS if it is to be considered as an alternative

3 Following the July 7, 2000 publication of the DEIS, the Bureau of Reclamation on August 8 published the 7 States' proposed interim surplus guidelines (65 Fed Reg 48531). According to Reclamation, a "preliminary review" of the plan indicates that it lies "within the range of alternatives and impacts analyzed in the DEIS." However, since it has not been formally presented within the DEIS as an alternative, analyzed in the same manner as other alternatives presented in the DEIS, and contains different elements than other alternatives presented, it must be included and analyzed in a supplemental DEIS before it can be considered as an alternative and potentially selected as the preferred alternative. CEQ regulations require that the alternatives section of an EIS "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." (40 CFR 1502.14)

B. The "Pacific Institute" alternative is a reasonable alternative and should be included and analyzed in a DEIS

4 Article I(2) of the long-range operating criteria for the Colorado River Reservoirs requires a plan of operation that reflects "appropriate consideration of the reservoirs for all purposes, including…enhancement of fish and wildlife, and other environmental factors." (35 Fed Reg 8951) As a clarification of the long-range operating criteria, the development and implementation of interim surplus criteria are subject not only to the needs of California and the other basin states, but to the long-range operating criteria and other elements of the Law of the River and the laws of the United States, including NEPA and the ESA. The adoption of any of the current alternatives for interim surplus criteria, other than the 7 State Plan would not meet the Secretary's environmental responsibilities within system operations. The alternative submitted to Interior by the Pacific Institute and nine other environmental organizations meets both the purpose and need for interim surplus criteria and the Secretary's broader environmental responsibilities. Contrary to Reclamation's assertion on page 2-3 of the DEIS that "the delivery of water to or through Mexico would require modification of the Treaty," delivery of water to Mexico beyond the *minimum* amounts required by the treaty could be undertaken unilaterally by the United States. Therefore, the Pacific Institute alternative both meets the purpose and need for the action and is reasonable.

CEQ regulations on the preparation of NEPA documentation require that an EIS "rigorously explore and objectively evaluate all reasonable alternatives." (40 CFR 1502.14(a)) The exclusion of a reasonable environmental alternative that both meets the purpose and need for the action and includes limited dedication of resources for environmental purposes is arbitrary and capricious. A supplemental DEIS which fully includes and analyzes the Pacific Institute alternative should be prepared and distributed.

3: Please refer to the response to Comment 10-4.

4: An EIS need not consider an infinite range of alternatives, only reasonable and feasible ones and those reasonably related to the purposes of the project that afford a reasoned choice by the decision maker. The rule of reason shall be utilized in development of a range of alternatives. NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences. For these reasons, Reclamation considered the Pacific Institute proposal but eliminated it from further analysis because part of it did not meet the purpose and need of the proposed action and the remainder of the alternative mirrored the Six State's Alternative which was analyzed in depth for the DEIS. Please also refer to the response to Comment 11-2.

C. The California "4.4 Plan" must be included

Integral to many of the alternatives presented in the DEIS is the implementation of the California plan to reduce the state's use down to its legal entitlement (frequently – although perhaps erroneously – referred to as the "4.4 Plan"). The DEIS explicitly states that "the Secretary may condition the continuation of interim surplus criteria for the entire period through 2015 on a showing of satisfactory progress in implementing the 4.4 Plan." (DEIS, 1-22) However, no version of this 4.4 Plan has been included in the DEIS. Without the 4.4 Plan it is impossible to measure the quantities of water involved in the alternatives that include implementation of the plan, and likewise it is impossible to gauge California's compliance.

We realize that all the details of the 4.4 Plan and its implementation have not been worked out. However, CEQ regulations mandate the inclusion of such materials in a DEIS: "If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement." (40 CFR 1502.22(a)) A supplemental DEIS which includes the California 4.4 Plan should be prepared and distributed.

D. The Upper Colorado River Commission's new depletion schedule must be included

The modeling and analysis that was included in the DEIS used a depletion schedule for the Upper Basin states that was developed in 1996. A new schedule was developed in 1999 (DEIS, 3.4-11). Given the importance of Upper Basin depletions to the results of the modeling and the determination of effects on the environment, the updated depletion schedule should be used in the modeling of effects and such model results should be made available for review prior to release of a FEIS. A supplemental DEIS which includes analyses based on the updated depletion schedule should be prepared and distributed.

E. The geographic scope omits areas of potential impact

A material failure of the DEIS is its omission of several potentially affected geographical areas in the geographic scope and subsequent analysis within the document. Of significant concern is the omission of the area from the Northerly International Boundary to the Southerly International Boundary (Limitrophe Division), as well as the river and its full floodplain within its delta in Mexico, all the way to the Gulf of California. These areas must be included in the supplemental DEIS.

F. Scope of Affects Analysis Inappropriately Omits Areas Subject to Other Environmental Mitigation Programs

In several places, the DEIS omits any affects analysis for a geographic area due to the existence of another existing environmental mitigation program. This is most notable in the analysis of affects of the proposed action within the Grand Canyon reach of the Colorado River,

5: The purpose and need acknowledge California's efforts to lower their Colorado River consumptive use. The DEIS did note that in Section 1.4, Related and Ongoing Activities, the 4.4 Plan, now the California Colorado River Water Use Plan (CA Plan), was under development. Further, the CA Plan is not a federal action. To the extent federal actions are required as part of the plan, each element will undergo appropriate environmental compliance. As evidenced by the recent draft version of the CA Plan, this is still a work in progress although various parties have different views. Reclamation has never viewed surplus as a part of the CA Plan. Moreover, the measure of progress in implementing the CA Plan concerns reduction in water need rather than physical or institutional arrangements.

6: Revised depletion schedules provided by the Basin States were used in FEIS analyses. See response to Comment No. 14-10 for more detail.

7: The area of potential effect has been expanded for the FEIS to include the Colorado River and 100-year floodplain to the Southerly International Boundary within the U.S. Section 3.16 of the EIS, Transboundary Impacts, addresses potential effects within Mexico.

8: An anlaysis of the frequency with which the triggering criteria for BHBFs and low steady summer flows would be met under each of the alternatives has been conducted for the FEIS (see Section 3.6). When compared to the baseline conditions, the probability of a BHBF being triggered under the preferred alternative is reduced by 1.1% during the interim period (through 2016) and by 0.1% during the remaining period (through 2050). The probability of a low steady summer flow being triggered under the preferred alternative is reduced by 2.9% during the interim period and increased by 0.3% during the subsequent period. Given the margin of error in forecasting runoff, these proposed minor changes are not expected to impact the resources in the Colorado River corridor form Glen Canyon Dam to the headwaters of Lake Mead.

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which is currently managed through the Glen Canyon Dam Adaptive Management Program. The DEIS states that there may be effects from the action on Beach Habitat Building Flows (BHBFs) and low steady summer flows, and models some of the potential effects, but provides no analysis on the potential effects to the environment of impacting those management tools. Subsequent analysis of environmental consequences virtually ignores the Grand Canyon reach, based on a determination that beyond the affect of these actions on "riverflows" this action has no affect on the Grand Canyon reach, and "the unaffected aspects of dam operations and the effect on downstream resources need no further analysis outside of the ROD and the Adaptive Management Program." (DEIS, 3.2-5)

These omissions are inappropriate. CEQ regulations regarding analysis of environmental consequences requires discussions of, among other things, "indirect effects and their significance" (40 CFR 1502.16(b)) and "possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned." (40 CFR 1502.16(c)) The potential conflicts or affects of the proposed action on other environmental mitigation programs must be included in the supplemental DEIS.

G. Cumulative impacts are not fully addressed

9

The DEIS omits any discussion of cumulative impacts resulting from a number of other ongoing actions. Most notably, it fails to consider cumulative impacts from the actions following from the U.S. Fish and Wildlife Service's Biological and Conference Opinion on Lower Colorado River Operations and Maintenance (1997), impacts from the California 4.4 Plan, and impacts from the regulation for off-stream storage and banking. Such omissions should be corrected in the supplemental DEIS.

H. A Preferred Alternative is not identified

10

CEQ regulations require that agencies "identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference." (40 CFR 1502.14 (e)) The DEIS does not identify a preferred alternative. In the interest of meaningful public review and comment, a supplemental DEIS should be prepared and distributed which either identifies a preferred alternative or provides an explanation for why a preferred alternative does not exist.

II. Some Analysis in the DEIS is Deficient and/or Inaccurate

Southwest Rivers has identified a number of ways in which the analysis of the proposed action in the DEIS is deficient and/or inaccurate.

9: Additional information has been included in Section 4.2 of the FEIS to expand the cumulative impacts analysis. However, impacts of the California Colorado River Water Use Plan or from off-stream storage and banking is considered to be outside of the area of potential effect of the proposed action. The 4.4 Plan and off-stream storage by the California parties are ongoing and other projects are only proposals at this time. These potential actions are speculative at present and without decisions that constitute an action for analysis; and do not depend on interim surplus criteria but rather are state actions. Reasonably foreseeable California actions will be analyzed through the CEQA process and, if decision documents are available will be incorporated into this EIS. Actions required under the approved 1997 LCR Operations Biological Opinion are not subject to NEPA.

10: CEQ regulations do not require the identification of a preferred alternative in the DEIS, if none has been determined. A preferred alternative will be identified in the FEIS. Defining a preferred alternative in the FEIS does not define the agency's final decision but lets the public know what the agency considers the best alternative. No supplemental DEIS is required.

Southwest River comments on
Interim Surplus Criteria DEIS
8 September 2000
Page 5

A. Modeling assumptions may be inaccurate and create distortion of results

11 Reclamation has used results of a basin-wide model to analyze the impacts of the various alternatives. However, the sensitivity of the model to certain questionable assumptions belies the confidence in the results, manifested in their detailed presentation, contained within the DEIS. In particular, the results of the model are most sensitive to projections of future inflows, the least reliable data, which may not even fall within the range of flows seen in the period 1906-1990, the range used for modeling. Furthermore, the accuracy of the model decreases the further it projects into the future.

Southwest Rivers suggests that several of the assumptions common to all alternatives be refined.

12 • The Index Sequential Method (ISM) used in the model may not capture the full range of potential inflows, given the extreme variability that characterizes the Colorado River system. We suggest that a partially random model be used in order to increase the range of possible flows in the interim period.

21 • As mentioned above, more recently developed depletion schedules for Upper Basin use are available. We suggest that the more recent schedules be used in the model.

22 • We recommend that the starting elevation for Lake Mead be changed from the level on January 1, 2000 to the projected elevation on December 31, 2000, which is expected to be approximately thirteen feet lower due to lower than average inflows in 2000.

23 • The model assumption for the delivery point to Mexico is inaccurate. We suggest that the model be refined to reflect the actual delivery point at the SIB, the fact that NIB delivery is not made within the delivery channel, and the fact that SIB deliveries are actually Arizona return flows rather than mainstem water.

24 • The model assumes operation of the Yuma Desalting Plant by 2015, but the DEIS gives no justification for the assumption. The model should eliminate this assumption unless and until the environmental impacts of operating the YDP have been analyzed and documented.

Similarly, we suggest that some of the assumptions particular to individual alternatives be clarified or refined.

25 • The baseline, which in essence follows the "criteria" used in 1997 (equivalent of a 75R strategy) to declare a surplus, appears to have been arbitrarily selected. Surplus declarations were made by the Secretary without formal criteria for the years 1996 through 2000. Selecting 1996 as the baseline would have created a baseline from a much more liberal definition of surplus, while selecting the years 1998-2000 would have created a baseline that matched a flood-control definition of surplus. Given the importance of the baseline (No Action) alternative in evaluating the other alternatives, Reclamation should explain why it used a single year (1997) as the correlative of the baseline condition instead of the three most recent years of surplus declarations.

26 • The baseline and flood control alternatives assume that California will consume only about 4.4 maf a year. This does not accurately reflect actual conditions. If California were only

11: See response to Comment No. 31-8a for a discussion of the Index Sequential Method of modeling.

12: See response to Comment No. 31-8a for a discussion of the Index Sequential Method of modeling.

21: Revised depletion schedules provided by the Basin States were used in FEIS analyses. See response to Comment No. 14-10 for more detail.

22: The starting Lake Mead elevation used in the FEIS model was changed from January 1, 2000 to January 1, 2002 in order to reflect estimated reservoir conditions at the beginning of the interim surplus period. Reclamation used the 24-month study model to develop a January 1, 2002 projection based on reservoir content in September 2000 and forecasted and average future hydrologic conditions. This enabled setting the FEIS model start date to match the interim surplus criteria start date of January 1, 2002.

23: The delivery of Colorado River water to Mexico was simplified in the model to simplify and facilitate the analysis of water deliveries to Mexico. An explanation of how water is actually delivered to Mexico and the modeling assumptions with respect to the delivery of water to Mexico has been added to Section 3.3.3.3 (General Modeling Assumptions).

24: The FEIS assumed that the Yuma Desalination Plant would be operational after 2022. See response to Comment No. 37-11 for further discussion.

25: The 75R modeling criteria used in the DEIS has been changed to 70R for the FEIS. Section C of this volume includes a discussion of this change.

26: Reclamation assumes that California will abide by the use determinations as spelled out in Article II(B)(1-3) of the Decree, therefore ALL alternative model runs assume a California use of 4.4 maf when the Secretary makes the determination of a normal year (7.5 maf available) in accordance with Article II(B)(1) of the Decree. California has prepared and submitted depletion schedules that specify the amount of water scheduled for delivery and the location at which delivery is requested under normal, surplus and shortage water supply conditions. The delivery of water to California during the interim surplus criteria period is dependent on the prevailing water supply conditions and is modeled pursuant to this and the applicable depletion schedule. A copy of the revised depletion schedule prepared and submitted by California and used for the modeling of the baseline and surplus alternatives for the FEIS is included in Attachment H.

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consuming 4.4 maf per year, there would be no need for interim surplus criteria. In fact, it is highly unlikely that California will fully reduce its use to 4.4 maf (a fact apparently reflected in its Plan), and inconceivable that is will reduce its use by more than 0.8 maf in a single year. Therefore, the baseline and flood control alternatives should be modified to reflect a more realistic projection of California's use.

B. The presentation of model results needs improvement

To improve the presentation of the model results and allow improved review and comment upon the alternatives and their environmental impacts, we suggest the following modifications:

13
- Present annual-scale model results at more frequent data points. Begin with actual 1999 data as a baseline, then give model results for, at the minimum, the years 2000, 2005, 2010 and 2015, in addition to the results provided for the period following termination of the interim surplus criteria.

27
- Select "representative" monthly flow results, intended to show seasonal changes in flows to the delta, that capture actual maximum and minimum flows to the delta. The months selected (January, April, July and October) are unlikely to capture true seasonal variability in flows.

28
- In order to determine river stage, which is important in determining impacts to riverine shoreline habitats and the potential for over-the-bank flows in the floodplain in Mexico below Morales Dam, the model should be modified to project instantaneous releases.

C. The predictability to California is overstated

14

The Purpose and Need for the action states that "Through adoption of specific surplus criteria, the Secretary will be able to afford mainstream users of Colorado River water, particularly users in California who currently utilize surplus flows, **a greater degree of predictability** with respect to the likely existence or lack thereof of surplus conditions on the river in a given year." (DEIS, 1-3, emphasis added). This is inaccurate, and overstates the predictability of surplus flows in a given year, especially to California (who will be relying most heavily on availability of such flows). Any declaration of surplus is *primarily* dependent upon hydrology and inflows. Storage conditions will also influence the likelihood of surplus flows, but even storage conditions can be overshadowed by extreme inflow conditions. Should the Colorado River system enter into an extreme and prolonged drought beginning in 2001, there may be no surplus declarations within the 15 year interim period, despite the fact that surplus flows are anticipated by the action to provide California with a "soft-landing" while it makes strides to reduce its consumption of Colorado River water. The purpose and need statement should be revised to reflect the reality that the action may provide greater predictability of surplus flows given a set of inflows and storage conditions, but the absolute predictability of surplus flows remains low.

13: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results.

27: The intent of the analysis presented in Section 3.3.4.5 was not to evaluate the maximum or variation in seasonal flows to the delta but rather to evaluate and acquire an understanding of the potential effect of the surplus criteria under the modeled surplus alternatives relative to the modeled baseline conditions. Reclamation is of the opinion that the analysis presented in Section 3.3.4.5 accomplishes this.

28: The RiverWare model is a monthly time step model and as such is limited to evaluation of Colorado River operation conditions on an aggregated monthly basis. Reclamation will take this suggestion into consideration when making future improvements to the RiverWare model.

14: Reclamation agrees that we can not absolutely predict when surplus flows will be available in coming years. Inflow into the Colorado River and carryover storage from year to year are the variables in the system with the greatest impact on the system. However, Reclamation believes that the DEIS was accurate regarding predictability and that given certain hydrologic assumptions users will be able to predict with greater certainty the existence of surplus and expected amounts of surplus available, doing away with the dynamic factors currently used in the AOP.

D. California's use does not drop to 4.4 maf with this action, nor are there terms for determining California's non-compliance and subsequent termination of the criteria

15 The purpose and need for this action seems to indicate that implementation of the action will facilitate California's reduction of use of Colorado River water down to its legal entitlement of 4.4 maf during the fifteen year interim period. However, as indicated earlier, it appears that California will not get down to 4.4 maf, and perhaps will not even attempt to do so within its Plan. This reality undermines the purpose and need for the action.

Furthermore, although the DEIS states that the Secretary "may condition the continuation of interim surplus criteria for the entire period through 2015 on a showing of satisfactory progress in implementing the 4.4 Plan," (DEIS, 1-22) there are no mechanisms set out within the DEIS for determining what constitutes satisfactory progress, and no terms for terminating the interim surplus criteria based on California's non-compliance. These mechanisms and terms are essential, and should be included in a supplemental DEIS.

E. The analysis of transboundary impacts is inadequate

16 Although it is encouraging to see that the DEIS addresses transboundary impacts, the analysis is cursory and based on less-than-current data. The analysis fails to acknowledge the potential impacts to the Gulf, the listed species (vaquita and totoaba) in the Gulf, and the socioeconomic impacts of further reductions in flow to the Gulf.

F. Critical habitat for bonytail and humpback chub is incompletely stated

17 Designated critical habitat for the bonytail is stated in the DEIS (3.8-20) as the section in the Colorado River from Hoover Dam to Davis Dam (including the Mohave to its full pool elevation) and Lake Havasu (to its full pool elevation) (50 FR 13374). The statement of designated critical habitat for the humpback chub (3.8-21) is also incomplete. It omits designated critical habitat in Grand Canyon, which includes the Colorado River from Nautiloid Canyon (RM 35) to Granite Park (RM 209) and the lower 8 miles of the Little Colorado River. (50 FR 13374).

G. The effect on whitewater boating in Cataract Canyon is omitted

18 The DEIS incorrectly states that "the only effect that the implementation of the interim surplus criteria alternatives would have on whitewater boaters would be the lowered pool elevations in Lake Mead." (DEIS, 3.9-34) During the period of implementation, Lake Powell end of year elevations are projected to decline, dipping below 3,640 elevation for the Shortage Protection Alternative in 2015 (Figure 3.9-1). As Lake Powell elevations decline, additional rapids are exposed in Cataract Canyon, expanding the whitewater boating opportunity in that stretch of river above Lake Powell. Therefore, implementation of the action would have a positive impact for whitewater boaters in Cataract Canyon during the implementation period.

15: See response to Comment 11-9. Whether or not California actually reduces to 4.4 maf does not eliminate the need for objective criteria that are subject to periodic reviews. Reclamation believes the preferred alternative meets the purpose and need and also will assist California in moving towards using 4.4 maf during the term of the interim surplus criteria.

16: Section 3.16.5.3 has been added to the FEIS to provide additional information on the general potential impacts that the implementation of the interim surplus criteria may have on the frequency of excess flows to Mexico as well as the potential resultant impacts to groundwater recharge and salinity south of the international border. Section 3.16.6 has been expanded to include additional information about potential impacts of the proposed interim surplus criteria on special status species and their habitat which may occur in both United States and Mexico. The Executive Order on Environmental Effects Abroad, as discussed by 3.16.2, focuses on impacts to natural resources, and specifically excludes consideration of socioeconomic impacts.

17: The descriptions of designated critical habitat have been corrected for the bonytail and humpback chub.

18: Section 3.9.4 has been revised to include the beneficial effects of lower pool elevations for whitewater boating in the Colorado River at the headwaters of Lake Powell.

*****

Southwest Rivers declines to formally comment on the 7 State Plan, since it has not been presented in a DEIS as an alternative. However, preliminary review of the plan spurs us to point out several deficiencies which should give Reclamation pause when considering its inclusion in present form as an alternative in a supplemental DEIS.

First, the proposal in its current form does not conform with the purpose and need of the interim criteria. The 7 State Plan does not provide a starting point for measurement of California's consumption, but given that such consumption has been as high as 5.2 maf in recent years and the plan envisions maximum conservation of 490,000 af by 2016, this plan will fail to bring California within its legally entitled use during the implementation period.

19

Second, the proposed plan inappropriately attempts to constrain the Secretary's discretion to allocate unused apportionments under Article II(B)(6) of the Supreme Court Decree in *Arizona v. California*. The states may not dictate how the Secretary is to use his discretion in making such allocations, and should the Secretary wish to establish firm guidelines for the exercise of his discretion, as he is currently doing in regard to surplus criteria, he would arguably be subject to the requirements of NEPA.

Finally, the proposed plan inappropriately attempts to preclude releases of water for any purposes other than those outlined in the Plan. This would preclude potential releases for environmental mitigation. The Secretary may need to release water to meet his other legal responsibilities as water master in the lower Colorado River, and the states have no legal authority to prohibit him from making releases for other purposes.

In conclusion, Southwest Rivers believes that the DEIS is inadequate and must be revised, augmented and reissued as a Supplemental DEIS. We feel that the omissions and deficiencies that we have identified in these comments clearly point out that the DEIS is so inadequate as to preclude meaningful analysis. We earnestly hope that the supplemental DEIS will recognize the core fact that environmental needs *must* be met before any quantity of discretionary water is dedicated to consumptive uses. Until that occurs, the additional water is not truly "surplus."

20

Feel free to contact me if you have any questions about our comments.

Sincerely,

Pamela Hyde

Pamela Hyde
Executive Director for Policy
Southwest Rivers

19: The preferred alternative in this FEIS has been derived from the Seven States proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

20: Reclamation does not concur with the opinion expressed in this comment. The analysis of effects of the alternatives on reservoir levels and river flows, and the potential effects on resources, provide a meaningful disclosure of effects for public consideration and permit a reasoned choice by the decision maker. This FEIS contains various refinements and additional detail from public comment, modeling, and coordination with interested parties and agencies.

WATER USER AGENCIES AND ORGANIZATIONS

CENTRAL ARIZONA PROJECT
P.O. Box 43020 • Phoenix, Arizona 85080-3020 • 23636 North Seventh Street (85024)
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September 8, 2000

BCOO/0900
4600

Regional Director
Lower Colorado Region
c/o Jayne Harkins, BCOO-4600
Bureau of Reclamation
PO Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

The Central Arizona Water Conservation District (CAWCD) is offering written comments on the Draft Environmental Impact Statement regarding the proposed Colorado River Interim Surplus Criteria. CAWCD is the local governmental entity with the responsibility for repayment to the USBR for the reimbursable construction costs of the Central Arizona Project (CAP) and for operation and maintenance of the CAP.

1 As the CAP has junior water rights on the Lower Colorado River, we are the water user entity most severely impacted by shortages. As the CAP and Arizona are not yet fully utilizing our full apportionment for direct use, CAP is the least likely to benefit from more frequent surplus supplies. Nonetheless, CAWCD will generally support interim surplus criteria that creates more frequent surplus supplies, principally for the benefit of California, as part of an overall plan for California to develop the capability of living within its 4.4 MAF base allocation of Lower Colorado River water. However, this interim surplus criteria must be hydrologically reasonable and contain certain provisions to receive CAWCD's support. The alternative that best meets our concerns is the 7-Basin States' Proposal.

2 The Draft Environmental Impact Statement (DEIS) considers a broad range of alternatives that readily encompasses the criteria and impacts associated with the 7-Basin States' Proposal. The addition of the 7-Basin States' Proposal through the separate Federal Register notice should allow ample opportunity for consideration as the Secretary develops the final recommendation. During the scoping process, CAWCD and others stated that we did not feel the EIS process was necessary or helpful, reasoning that the Secretary could develop surplus criteria or guidelines within the parameter of the Long Range Operating Criteria and as a part of the Annual Operating Plan process. The EIS process is, however, well underway and should lead to a timely decision in this matter.

1: The preferred alternative in this FEIS is derived from the Seven States proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with Reclamation policy and operational procedures.

2: The Department notes that CAWCD did not "fell the EIS process was necessary or helpful". The Secretary has determined that development and implementation of interim surplus criteria is a discretionary federal action that may have significant impacts on the environment, thus is subject to NEPA process through the preparation of an EIS. The EIS analyzes the potential impacts to resources and forms the technical basis for the Secretary to make an informed decision in the Record of Decision of which alternative best meets the purpose and need for the proposed action and what impacts are expected.

Ms. Jayne Harkins
September 8, 2000
Page 2

3 Despite man's efforts, we have not been able to control the Colorado River. It is a river of wide variation in river flows, from flood to dry, even with all of our storage reservoirs. The studies portrayed in the DEIS demonstrate that over the next 50 years the reservoirs and river flows will experience the same range of highs and lows, no matter what alternative criteria are used over the next 15 years. Only the frequency and duration of the time spent in various conditions will change. There appears to be no conclusively measurable impact upon habitat. We have been able to harness the river and reap some of its benefits: water supply, flood control, hydro power, recreation and managed habitat. All of the model studies that were performed can help us to predict the impact of alternative operating strategies on the primary benefits of flood control, water supply, and hydro power. Interim surplus criteria most directly affects water supply. As previously noted, the CAP is the project most affected by changes in water supply.

3: Comment noted.

4 Absent a need to address and assist California water issues, CAP would prefer to stay with the 70R Baseline criteria. Within the range of alternatives considered, the 7-Basin States' Proposal has the most reasonable hydrologic criteria for a tiered plan to quantify and reduce the surplus supply as reservoir storage is reduced. It is the only alternative that requires California to accept the risk of increased shortages by agreeing to accept the first 1.0 MAF of shortage if the interim criteria do, in fact, cause more frequent or more severe shortages.

4: The 70R strategy was used as the baseline in the FEIS. The Basin States alternative in this FEIS is derived from the Seven States proposal.

There are a few areas in the 7-Basin States' Proposal that need improvement.

5 1) There needs to be more detail on how California will bear the additional shortage risk and how those conditions will be enforced.

5: The Secretary intends to appropriately report the accumulated volume of water delivered to MWD under surplus conditions. The Secretary intends to honor forebearance arrangements made by various parties for reparations of future shortage conditions.

6 2) There is some inequity in that MWD is allowed to divert and bank surplus Colorado River water for "off-stream banking" as part of its "Direct Delivery Domestic Use". Yet, Arizona is allowed to do "off-stream banking" only at the two highest levels of surplus, i.e., quantified surplus at 70R and flood control surplus. In the context of an overall consensus agreement, CAWCD may be willing to accept this inequity. Our hope is that the river system will often be in a 70R mode over the next 15 years.

6: Comment noted.

7 3) The shortage criteria used in all of the DEIS studies, including the 7-Basin States' Proposal, are based on specific Lake Mead elevation levels. One is 1083 msl, as the minimum power pool; another is 1000 msl, the elevation of the lower Southern Nevada Water Authority (SNWA) intake; the 7-Basin States' Proposal is 1050 msl, the upper SNWA intake. All of these specific elevations are economic criteria. The shortage trigger should be a water supply/current demand driven analysis similar to the 602(a) criteria for Lake Powell storage. It should be the current level of storage needed to support deliveries to the Lower Basin states without causing the CAP supply to fall below 1.0 MAF (or Arizona below 2.3 MAF) during the most critical period of record.

7: There are no established shortage criteria for the operation of Lake Mead. Further, the development and evaluation of interim surplus criteria under this FEIS is not intended to establish shortage criteria for the operation of Lake Mead. However, it was necessary to include some shortage criteria in the model simulations to address concerns related to low Lake Mead water levels. The selected Lake Mead level protection assumptions were applied to the model to facilitate the evaluation of the baseline conditions and surplus alternatives.

8 The primary reason to consider interim surplus operating criteria is to allow and require California to take the actions necessary to reduce its use of Colorado River water to 4.4 MAF. It

8: As discussed in the purpose and need, the purpose is to provide "a greater degree of predictability" of when surplus water is, or is not, available. Reclamation agrees that some of the interim surplus criteria alternatives would facilitate California's reduction of its water use to 4.4 maf. However, this is not the primary purpose. As noted in Section 2.3, the interim surplus criteria would terminate at the end of the 15-year period. In the absence of subsequently specified criteria, surplus determinations would be made as is currently done, as part of the AOP process. Section 1.4.1 discusses the termination of the interim surplus criteria prior to the end of 15 years.

Ms. Jayne Harkins
September 8, 2000
Page 3

cont'd

is particularly disturbing to note in paragraph S.4.4 of the DEIS that the "Secretary may choose to terminate the interim criteria and revert to the current method" if California fails to meet its goals. We believe the commitment to terminate the interim criteria must be an enforceable agreement among the states and the Department of the Interior, not a purely discretionary action on the part of the Secretary.

9

As the single largest contract holder for Arizona's share of Hoover B power, we are interested in the impacts of interim criteria on the long term trends of Hoover power production. The model studies indicate, as expected, that in all scenarios increasing demands for water supply will lower reservoir levels and the resulting loss of power head will reduce generation. In analyzing the various alternatives, the DEIS compared the changes in hydropower production on a regional basis, noting that the hydropower provides only 3.6% of the region's resources. It would be more helpful if the impacts were noted on the specific group of federal hydropower contractors. This would be more consistent with the analysis of the economic impacts on pumping costs for the SNWA or the economic impact analysis on recreation facilities at Lake Mead and Lake Powell.

10

The DEIS is quite detailed. We question some of the modeling assumptions used, particularly the surplus demand schedule, but will not offer any specific comments. We believe adequate comments on modeling concerns were raised at the modeling workshop conducted by Reclamation.

11

We disagree with the analysis of the impact of shortages. On page 3.4-5, the DEIS states that shortages will impact agricultural water use and recharge initially, then M&I use later. We believe shortages will impact Indian use if current settlement discussions result in no Indian agriculture being reallocated for Indian use. In addition, some Indian water rights water is shorted before M&I. While there is more detail included in Tables 3.14-3 and 3.14-4, there is some confusion because both Tables have the same title. We believe Table 3.14-4 should be titled . . . With GRIC . . . In any case, it does not appear the assigned shortages are consistent with our interpretation of current priorities or with the priority scheme developed in the GRIC settlement discussions.

12

CAWCD believes that the DEIS improperly considers the impacts in Mexico from Reclamation's actions in the United States. In general, there is a strong presumption against the extraterritorial application of U.S. laws. The courts have held that NEPA, in particular, should not be applied outside the United States, in part because of potential conflicts with foreign policy and treaty matters. That is especially true here, given the 1944 treaty with Mexico.

13

The CAWCD supports the comments offered by the Arizona Department of Water Resources and intends these comments to complement and supplement their comments.

9: Comment noted. Reclamation believes that the level of analysis for energy resources presented in the EIS appropriately identifies the potential effects of interim surplus criteria.

10: The water depletion schedules used in DEIS for the modeling of the baseline conditions and surplus alternatives were revised and updated by the Basin States for the FEIS. The individual states developed these revised schedules in coordination with Reclamation, the various Colorado River water contractors, Indian Tribes and local agencies. A summary of the updated Upper and Lower Division depletion schedules are presented in Attachments H and K of the FEIS, respectively.

11: The modeled Colorado River water deliveries under the baseline conditions and surplus alternatives assumed that all Arizona shortages would be absorbed by the Central Arizona Project. Reclamation acknowledges that under the current priority framework, there would be some sharing of Arizona shortage between the Central Arizona Project and other Priority 4 users. However, the bases or formula for the sharing of Arizona shortages is the subject of current negotiations and as such, could not be adequately modeled for the FEIS. The water supply conditions modeled for the FEIS were used to evaluate the relative differences in water deliveries to each state under baseline conditions and the surplus alternatives. The normal, surplus and shortage condition water depletion schedules modeled in the FEIS are consistent with the depletion schedules prepared by the Basin States for this purpose.

12: The applicable guidance appears to be contrary to your comment. EO 12114, Environmental Effects Abroad of Major Federal Actions, 44 FR 1957, 1979 WL 25866 (Pres.) requires that federal agencies "... consider the significant effects of their actions on the environment outside the U.S., its territories and possessions,..." Recent CEQ guidance for transboundary impacts, dated July 1,1997, appears consistent with the approach in the Executive Order.

13: Comment noted.

Ms. Jayne Harkins
September 8, 2000
Page 4

In summary, CAWCD can support the 7-Basin States' Proposal with: 1) a stronger enforcement mechanism in the event that California does not comply with its 4.4 MAF plan; 2) enforceable commitments for California's reparation for increased water supply shortages; and 3) a commitment to develop more specific supply/demand shortage criteria similar to the 602(a) criteria used for Lake Powell in the future.

Sincerely,

Larry R Dozier

for David S. "Sid" Wilson, Jr.
General Manager

jlm
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001.06
cc: Rita Pearson, ADWR

ESTABLISHED IN 1918 AS A PUBLIC AGENCY

COACHELLA VALLEY WATER DISTRICT

POST OFFICE BOX 1058 • COACHELLA, CALIFORNIA 92236 • TELEPHONE (760) 398-2651

September 8, 2000

File: 0022.139
SEP 11 2000 0306.315

Jayne Harkins, BC00-4600
U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
Post Office Box 61427
Boulder City, Nevada 89006

Dear Ms. Harkins:

This letter is in response to your transmittal of the draft Environmental Impact Study for the Colorado River Interim Surplus Criteria. The district values the opportunity to comment on this document.

Our comments are detailed in the enclosed Attachment A.

If you have any questions please call Robert Robinson, resource engineer, extension 424.

Yours very truly,

Tom Levy
General Manager-Chief Engineer

Enclosure/1/as

RAR:jl\eng\resource\2000\harkins

TRUE CONSERVATION
USE WATER WISELY

Interim Surplus Guidelines

Coachella Valley
Water District

ATTACHMENT A

1. Page 1-21, Section 1.4.1 California Colorado River Water Use Plan (4.4 Plan)

The Bureau of Reclamation implies that Interim Surplus guidelines will be in place prior to implementation of the 4.4 Plan and its associated settlement agreement quantifying the third, fourth, fifth and sixth priority California Colorado River water contractors.

1 These comments are submitted with the understanding that the issues outlined in Quantification Settlement Agreement will be resolved on the time table set by the Secretary of the Interior. The district reserves the right to modify and add to these comments in the event progress does not proceed according to the agreed upon time table; it being understood that lack of progress on the Quantification Settlement Agreement would materially change the scope and impact of the proposed Interim Surplus Guidelines.

2. Page 2-5, Section 2.3 Last Paragraph

2 One of the difficulties in administering Colorado River water rights among the California Colorado River contractors is the unquantified nature of their priority system contained within federal contract. The priority system implicitly redefines Colorado River water, not as a private commodity subject to private sale under a free enterprise system, but as a managed commodity restricted to a specific service area and subject to reasonable and beneficial use. The Description of Alternatives does not describe the duty of the Secretary to actively enforce his contracts by ascertaining the reasonable and beneficial use of water by each contracting party.

Page-1

1: Comment noted.

2: The Secretary's responsibilities in administering the river system and water delivery contracts are addressed in Chapter 1. For further information regarding reasonable and beneficial use and Reclamation's authority, see response to 56-29.

3. Page 3.4-6, 3.4.3.3 State of California, *Law of the River*

3 One of the difficulties in federal oversight of California's use of Colorado River water has been a priority system which allows water to cascade from one priority to another. In order for such a priority system to work, the locations where Colorado River water can be used in California must be limited to a highly detailed, specific service area. Without a specific area limitation, the priority system outlined by federal contract would not work. A description of this difficulty needs to be included between the sentence describing the *Law Of The River* and the 1964 Supreme Court Decree.

3: We note your comment and have added a third paragraph under Section 3.4.3.3 to add more details on the California priority system.

2.3.3 and 2.3.4

4 The establishment of Tiers 1 through 3 for the both the Six States Surplus Alternatives and the California Surplus Alternatives are a defacto rearrangement (Attachment D page7, Attachment E page A-5) of the California priority system. This rearrangement does not take place until execution of the Quantification Settlement Agreement which is a key element of the California 4.4 plan. The CVWD agrees with the combination approach taken including both water transfers and multi-tiered surpluses.

4: Comment noted.

5 More importantly, wording should be included stating that unilateral implementation of the Surplus Guidelines by the Bureau of Reclamation without the combined implementation of the Quantification Settlement Agreement and 4.4 Plan would favor one party at the expense of another party. i.e. a higher priority agricultural water contractor will be able to divert additional Colorado River water while transferring water outside of the existing priority system.

5: Comment noted. No transfers of California Colorado River entitlements may occur without the approval of the Secretary of the Interior. Mere determination of the operational criteria for surplus condition pursuant to the LROC favor no particular party in any state. Surplus waters are distributed in accordance with Article II(B)2 of the Decree unless other voluntary arrangements among the parties are in place.

4. Page 3.4-19, 3.4.4.2 State of California

6 The runs incorporating multi tiers and water transfers change the priorities among the California Colorado River water contractors (Attachment G schedules).

Wording should be inserted that the computer model contains the assumption that guideline implementation has a "transition" period allowing for the orderly movement from the existing priority system to the interim system.

6: We note your comment and have revised the first paragraph under Section 3.4.4.2, to address the transition period.

Interim Surplus Guidelines — Coachella Valley Water District

5. Page 3.16-1, Section 3.16-2 Methodology

7 The waters of the Colorado, once delivered, are the exclusive property of Mexico. The Bureau of Reclamation in extending the scope of the Environmental Impact Statement beyond the United States implies an extension of federal authority into a foreign country whose courts and laws do not recognize that authority. This document, if it is to include discussions on impacts in Mexico, must be reviewed and approved by the U. S. State Department prior to publication. If the review and approval of the State Department is not secured, Section 3.16 Transboundary Impacts must be deleted.

6. Page 4-1 Cumulative Impacts, second paragraph regarding intrastate water transfers.

8 Because the California priority system is a relative system of water allocation, any project or agreement between two parties with differing priorities will have impacts on other intermediate priorities. Therefore a guiding principle in the Quantification Settlement negotiations has been that implementation of the Quantification Settlement Agreement will occur all at once i.e. all elements combined as one package and no single element being implemented outside the Quantification Settlement Agreement. The cumulative impacts section should contain wording indicating that the Interim Surplus Guidelines are both a condition precedent of the Quantification Settlement Agreement, and an integral part of the California Colorado River Water Use Plan.

Page-3

7: Nothing in the DEIS implies an extension of U.S. federal authority into Mexico, nor could it. The US Section of the International Boundary and Water Commission (USIBWC) is a cooperator in this EIS process. As such, the USIBWC had an opportunity to review and comment on the DEIS and this FEIS prior to public availability. Accordingly, we decline the request to delete Section 3.16.

8: The purpose and need of the proposed action is to provide more specific surplus criteria and increased predictability with regard to surplus determinations. Reclamation is preparing a separate NEPA document to consider the Secretarial Implementation Agreements associated with the California Colorado River Water Use Plan.

Section 4.2 has been modified and Reclamation believes that it has appropriately addressed potential cumulative effects of the proposed action. Reclamation does not believe the adoption of surplus criteria is a component of the "California Plan," but does believe that surplus criteria should neither frustrate nor hinder California's efforts to reduce its Colorado River water use.

CREDA
Colorado River Energy Distributors Association

ARIZONA
Arizona Municipal Power Users Association
Arizona Power Authority
Arizona Power Pooling Association
Irrigation and Electrical Districts Association
Navajo Tribal Utility Authority (also New Mexico, Utah)
Salt River Project
COLORADO
Colorado Springs Utilities
Intermountain Rural Electric Association
Platte River Power Authority
Tri-State Generation & Transmission Cooperative (also Nebraska, Wyoming, New Mexico)
Yampa Valley Electric Association, Inc.
NEVADA
Colorado River Commission of Nevada
Silver State Power Association
NEW MEXICO
Farmington Electric Utility System
Tri-State Generation & Transmission Cooperative
City of Truth or Consequences
UTAH
City of Provo
Strawberry Electric Service District
Utah Associated Municipal Power Systems
Utah Municipal Power Agency
WYOMING
Wyoming Municipal Power Agency

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September 7, 2000

Ms. Jayne Harkins
Bureau of Reclamation
Attn: BCOO –4600
PO Box 61470
Boulder City, NV 89006-1470
(fax: 702-293-8042)

RE: COMMENTS ON DRAFT EIS ON COLORADO RIVER INTERIM SURPLUS CRITERIA

Dear Ms. Harkins:

The Colorado River Energy Distributors Association (CREDA) is an association of over 133 consumer-owned electric systems that purchase and distribute more than eighty-five percent of the energy produced by the Colorado River Storage Project (CRSP). In addition, CREDA members repay nearly ninety-five percent of the federal investment in the CRSP. CREDA member systems serve nearly three million consumers in six Western states. CREDA represents the majority of CRSP firm power contractors, who have a direct and specific interest in issues, which could affect Glen Canyon Dam operations and output.

1 CREDA has reviewed the DEIS on the Interim Surplus Criteria, and finds that under any of the alternatives, including the base case, there will be significant impacts to the firm power contractors of the federal power projects on the Colorado River. CREDA also finds that these impacts are not adequately recognized, analyzed or measured in the DEIS.

2 When the DEIS is being used as a planning process, which seems to be the case here, it is essential that it be a process which integrates impacts on all the resources. It is clear that power resources have not been fully integrated into this planning and analyses. The analyses of impacts does not accurately reflect: 1) the operating restraints on certain of the power plants, 2) how the plants are operated, or 3) the impacts of changed power operations on the firm power contractors. For example:

3 I. Sec. 3.10.2.2.1 – does not seem to recognize the greatly reduced generating capacity at Glen Canyon Dam which resulted from the Glen Canyon Dam EIS and Record of Decision. It also seems that the study assumed operating points at which both Glen Canyon and Hoover operate most efficiently. The plants are most often not operated at these points due to scheduling entities' use of the plants for regulation and reserves. The assumption skews the results and tends to minimize the impacts of changed operations.

4 II. Sec 3.10.2.2.2 –is far too simplistic in its assumption that the impacts will felt through a large area (WSCC) and are therefore minimal. What must be measured are the direct financial impacts to the power contractors. In the case of

1:The EIS analysis is intended to be an analysis of the alternatives compared to the baseline projections. As discussed in Section 3.1.3, baseline projections are used to compare possible future without interim surplus criteria to future with interim surplus criteria conditions. Under baseline conditions and each of the alternatives, the fact that reservoir elevations will have an increased probability to fall over time is predominantly a result of increased depletions in the Upper Basin states. Reclamation believes that the level of analysis for energy resources presented in the EIS, and the comparison of the alternatives to baseline conditions appropriately identifies the potential effects of interim surplus criteria.

2: The analysis shows the effects of each alternative reservoir operating strategy when compared to the baseline strategy. Increases or decreases in energy and capacity between the baseline strategy and the alternatives are shown on a yearly basis. This analysis accurately reflects the operating constraints on the powerplants in the modeling parameters. Powerplant operations change daily with differing conditions, but from an overall power production perspective, the analysis results provide a useful comparison of the anticipated reduction in energy and capacity within the WSCC region. A substantial portion of the reduction is included in baseline conditions; alternatives would result in incremental changes. The quantities of capacity needed to replace incremental reductions, while not significant when compared to the total capacity installed in the WSCC region, may have impacts on power contractors that must purchase replacement power. These impacts were not analyzed in the FEIS.

3: This analysis is not intended to analyze the effects of the Glen Canyon Dam Operation EIS and Record of Decision. The assumptions that were used for interim surplus criteria modeling related to operating points were used in the analysis of power production for both baseline conditions and each of the alternatives. Since the analysis contained in this EIS is concerned with the difference between baseline conditions and the alternatives, and the underlying assumptions are the same for all cases, the net difference should not change substantially.

4: Please see response to Comment 16-2.

cont'd Glen Canyon, as power production is reduced there is a direct and immediate upward impact on power rates. There is also an immediate additional cost to the contractors who must pay the costs of replacing the lost energy and capacity. The DEIS is completely silent on these impacts.

5 III. Sec. 3.10.2.3.1 – the proposed "easy" solution of buying replacement power from the short-term market trivializes the problem. The short-term wholesale power market this summer is causing major problems and severe economic impacts in San Diego and other areas across the WSCC. Industries are shutting down in California and the Northwest because of the short-term market prices.

6 IV. Sec 3.10.2.3.1.2 – cites the impact on the basis of an average of the study years. This is a gross oversimplification that minimizes the real financial impacts to power customers.

7 Overall the DEIS seems to be deliberately minimizing the impacts of power by using annual averages and measuring impacts on a regional basis. It does not deal with the direct financial impacts to power contractors. These contractors in the Upper Colorado River Basin Project are repaying 100% of the federal investment in power features and over 95% of the investment in irrigation projects, and are funding nearly all of the subsequent environmental studies and mitigation projects. Surely, the impacts of the surplus criteria on this important part of the equation deserve full analysis and discussion in the EIS process. The DEIS is significantly incomplete without these analyses. CREDA will be glad to assist in any way possible to achieve this goal.

I may be reached at (480) 557-0987 or email creda@uswest.net.

Sincerely,

Leslie James
Executive Director

Cc: CREDA Board

000907SurpCritEIS

5: Please see response to Comment 16-2.

6: Please see response to Comment 16-2.

7: Please see response to Comment 16-2.

COLORADO RIVER WATER CONSERVATION DISTRICT

Protecting Western Colorado Water Since 1937

SEP 11 2000

September 8, 2000

SENT VIA FACSIMILE& U. S. Mail

BCO01000
4600

Ms. Jayne Harkins
Attention BCOO-4600
U. S. Bureau of Reclamation
P. O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

The Colorado River Water Conservation District ("CRWCD") thanks you for the opportunity to review and comment on the Bureau of Reclamation's July 2000 "Colorado River Interim Surplus Criteria Draft Environmental Impact Statement" ("DEIS"). The CRWCD is an agency of Western Colorado with a mission to promote the protection, conservation and development of Colorado's water resources in order to secure the greatest utilization of those resources for the benefit of present and future generations. The CRWCD has reviewed the DEIS and provides the following comments.

1 The CRWCD strongly supports the Interim Surplus Criteria developed by the seven Compact River basin states and noticed in the Federal Register on August 8, 2000 as Supplemental Information to the DEIS. These criteria are a modification of the six state proposal described in the DEIS. Based on our analysis of the seven state proposal, we believe that proposal is superior to the six state proposal in the DEIS because there is less impact to reservoir storage, yet it still provides the water supplies sought. The interim criteria proposed by the seven basin states were developed using a 70R strategy, which is and has been the standard Colorado River reservoir operating strategy since the mid 1990s with one exception. While the 75R strategy has been reviewed on occasion as part of the annual operating plan development, it has never been the standard and we object to the DEIS suggesting that it is or has been the standard.

2

3 cont'd below The seven state interim criteria were also developed using the Upper Colorado River Basin depletion schedule adopted by the Upper Colorado River Commission in December 1999. The December 1999 depletion schedule shows that depletions are occurring slightly more rapidly than in the Upper Colorado River Basin depletion schedule used in the DEIS. However, the most important point to make is that, while these differences resulted in modifications to the six state

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(970) 945-8522 • FAX (970) 945-8799 • www.crwcd.gov

1: The preferred alternative in this FEIS is derived from the Seven States proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need for the proposed action, Reclamation policy and operational procedures.

2: The baseline has been changed to a 70R strategy for the FEIS.

3: The preferred alternative in this FEIS is derived from the Draft Seven States Proposal. The Upper Basin depletion schedule prepared in December 1999 was used to model the operation of the baseline and all the alternatives in this FEIS. The baseline has also been changed to the 70R operating strategy.

3 cont'd

proposal discussed in the DEIS, those differences and the impacts are within the range of alternatives and impacts analyzed in the DEIS. Because of its knowledge of the development of the DEIS supplemental information, the CRWCD is comfortable that the seven state proposal in the superior alternative and would likely strongly oppose the adoption of any interim surplus criteria that would change the standard or "no action alternative" in any other way.

4

Furthermore, the CRWCD, in its review of the DEIS, finds that there are a number of views expressed in the DEIS concerning the "law of the river" with which it disagrees or does not wholly concur. However, these differences do not significantly impact the results of the DEIS and, thus, the CRWCD does not see any merit in debating them in the DEIS process. However, the CRWCD wants it clearly understood by all parties that it is not, in any way, changing long standing positions on Colorado River issues as a result of the way they may be stated in the DEIS. Rather, we would strongly encourage the Bureau of Reclamation to include the usual disclaimer it uses to address the differences that exist with respect to the "law of the river."

5

In particular, in Section 1.4.2 of the Glen Canyon Dam Operations, the discussion of Glen Canyon operations is not precise. The Colorado River Compact requires the Upper Division states to not cause the flow at Lee Ferry to be depleted below an aggregate of 75 MAF (plus ½ of the Mexican Treaty Deficiency, if any) for any period of ten consecutive years. The Upper Division states have never agreed with the 8.23 MAF minimum objective release identified in the Long Range Operating Criteria. We would encourage that language be added to this section and others to fairly reflect what the compact requires.

In conclusion, even though we disagree with the way in which the law of the river is characterized in a number of places in the DEIS, we believe the DEIS and the supplemental information fairly portray the potential impacts of the possible actions and recommend that the Secretary adopt and implement the Seven Basin States Interim Surplus Guidelines. Thank you for considering the CRWCD's comments on this very important matter.

Sincerely,

R. Eric Kuhn
General Manager

4: Comment noted.

5: Glen Canyon Dam is operated according to the LROC as discussed in Section 1.4.2. Section 1.3.3 discusses the LROC and the process for review and modification of the LROC. This EIS does not address disparities between the LROC and the Colorado River Compact. Concerns over the relationship between the Colorado River Compact and the LROC should be addressed though the LROC review process.

Cottonwood Creek Consolidated Irrigation Company

August 30, 2000

Jayne Harkins
Attention: BC00-460
PO Box 61470
Boulder City, Nevada 89006

Dear Ms. Harkins:

We have reviewed the Colorado River Interim Surplus Guidelines prepared as the "Seven Basin States Consensus Proposal." We concur with the method that has been negotiated between the basin states and urge that the Secretary of Interior adopt this plan, as written, as the preferred alternative. 1

Sincerely,

Craig E. Johansen

Craig E. Johansen, President
Cottonwood Creek Consolidated Irrigation Co.

cc: Larry Anderson, Director
Division of Water Resources

P.O. Box 678 • Orangeville, Utah 84537

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with Reclamation policy and operational procedures.

EMERY WATER CONSERVANCY DISTRICT

P.O. Box 998
Castle Dale, Utah 84513

Telephone (801) 381-2311

September 11, 2000

4600

Jayne Harkins
Attention:BC00-460
PO Box 61470
Boulder City, Nevada 89006

Dear Ms. Harkins:

1 We have reviewed the Colorado River Interim Surplus Guidelines prepared as the "Seven Basin States Consensus Proposal." We concur with the method that has been negotiated between the basin states and urge that the Secretary of the Interior adopt this plan, as written in the Federal Register / Vol. 65, No. 153 / Tuesday, August 8, 2000, as the preferred alternative.

1: See response to Comment 13.19.

Sincerely,

Eugene Johanson, President
Emery Water Conservancy District

cc: Larry Anderson, Director
Division of Water Resources

GRAND WATER & SEWER

SERVICE AGENCY

3025 E. Spanish Trail Road
P.O. Box 1046
MOAB, UTAH 84532

To: **Ms. Jayne Harkins**
Attention BC00-4600
From: Gary Wilson, President
Subj: Comment on DEIS, Colorado River Interim Surplus Criteria

1 Grand Water & Sewer Service Agency would like to voice support of the "Seven State Proposal" for Interim Surplus Guidelines on the Colorado River. This proposal seems the most sensible to assure that each State in the Colorado River Compact will eventually receive its allotted share of Colorado River water. The proposal accomplishes this in a manner which places less burden on those states currently using in excess of their allotted share and at little or no risk to upper basin states.

1: See response to Comment 13-19.

BC00/4600

IMPERIAL IRRIGATION DISTRICT
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RPM

SEP 11 2000

September 8, 2000

FAXED & MAILED
Robert W. Johnson
Regional Director
Lower Colorado Region
Attn: Jayne Harkins (LC-4600)
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

LC-4600

Dear Mr. Johnson:

Subject: **Comments on Draft Environmental Impact Statement, *Colorado River Interim Surplus Criteria***

Imperial Irrigation District (IID) has reviewed and provides the following comments on the United States Bureau of Reclamation's (Reclamation) Draft Environmental Impact Statement (DEIS) regarding Colorado River Interim Surplus Criteria.

1 The DEIS has analyzed the following alternatives: no action alternative, Flood Control alternative, Six States alternative, California alternative, and Shortage Protection alternative. The Final Environmental Impact Statement (FEIS) should analyze *Interim Surplus Criteria Guidelines* ("Guidelines") developed by the Colorado River Basin states as published by Reclamation in Federal Register/Vol 65, No. 153/August 8, 2000. IID participated in the development of the Guidelines and supports the interim surplus criteria proposed therein.

2 From a general perspective, IID offers the following comments on the draft EIS. First, in order to maintain the public record, IID would like to remind Reclamation that compliance with NEPA in this situation is unnecessary. This issue was thoroughly addressed in comments from a variety of the basin states when Reclamation first announced its intention to undertake a NEPA compliance process for the interim criteria. As explained at that time, this interim criteria is well within the Secretary's existing authority to adjust operations at Hoover Dam within the terms of the Long Range Operating Criteria. Accordingly, there is no new "action" here upon which to base the need for NEPA compliance. Engaging in this sort of gratuitous NEPA compliance process is not authorized by NEPA, and therefore Reclamation's decision to undertake NEPA compliance in this situation only serves to confuse and mislead the public, and will also serve to mislead a court should this matter ever become involved in litigation.

3 Second, also for the record, IID objects to the decision of Reclamation to extend NEPA analysis into the country of Mexico (see sections 3.2 and 3.16). Although Reclamation relies on an old Executive Order and CEQ guidelines for this action, those authorities predate more recent

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need for the proposed action, Reclamation policy and operational procedures.

2: See response to Comment 43-2.

3: The applicable guidance appears to be contrary to the comment. EO 12114, Environmental Effects Abroad of Major Federal Actions, 44 FR 1957, 1979 WL 25866 (Pres.) requires that Federal agencies "... consider the significant effects of their actions on the environment outside the U.S., its territories and possessions...." The more recent CEQ guidance for transboundary impacts, dated July 1,1997, appears consistent with the approach in the Executive Order. See response to Comment 22-5.

cont'd

judicial decisions on this issue, and the cited authorities do not take into account the Supreme Court-imposed presumption against the extraterritorial application of federal domestic laws. Furthermore, Reclamation's extension of the NEPA analysis into Mexico ignores the dominant role of the 1944 Treaty between the United States and Mexico governing uses from the Colorado River. Both the Executive Order and the CEQ guidelines recognize that a controlling treaty may obviate the need for such NEPA compliance. Again, this sort of action only serves to mislead the public, and in this case, the citizens of Mexico as well.

4

Third, although the draft EIS appears to be silent on the matter, IID is concerned that the draft EIS presents a platform for Reclamation to engage in formal consultation under the Endangered Species Act (ESA) in relation to listed species located in Mexico. Because of other documents previously submitted to Reclamation, Reclamation is fully aware of the arguments posed by IID and the other California Colorado River using entities as to why the ESA does not apply in any way to listed species in Mexico. Fundamentally, IID's position rests on the wording of the existing ESA regulations, which are domestically oriented, and also on the Supreme Court-imposed presumption against the extraterritorial application of domestic laws. Since Reclamation has not indicated its intention to engage in formal or informal consultation under the ESA, IID urges Reclamation to maintain that position in future stages of this NEPA compliance process.

5

Fourth, IID notes that in section 2.2.3 of the draft EIS Reclamation explains why the proposal submitted by the Pacific Institute and others is not analyzed in this draft EIS. IID agrees with the rational advanced by Reclamation to support that decision. The recommendations made in the Pacific Institute proposal are expressly contrary to the terms of the 1944 Treaty with Mexico. Any deviation from that treaty, either for water quantity or water quality purposes, must be addressed through the authority of the Secretary of State, the President, and the Congress to control foreign affairs. There should be no attempt to analyze or effectuate such proposed action through the authority of the Department of the Interior or through application of the ESA or NEPA.

6

Regarding the technical analysis in general, IID agrees with the framework and the approach for the DEIS. The definition and estimation of the impacts as "incremental differences in probabilities (or projected circumstances associated with a given probability) between baseline conditions and the alternatives" (DEIS, p. 3-1) is appropriate. The application of the hydrologic modeling to quantify the impacts in this manner is also appropriate. However, we have the following concerns:

7

The DEIS makes an assumption that the conditions modeled for baseline conditions and Flood Control alternative do not include the implementation of the California 4.4 Plan and water transfers described in *Key Terms for Quantification Settlement Among the State of California, IID, CVWD, and MWD*, dated October 15, 1999 ("Key Terms"). IID recognizes that the adoption of interim surplus criteria acceptable to MWD is one of Conditions Precedent in the Key Terms. However, the purpose of this DEIS is to evaluate the impacts of the interim surplus criteria, not the impacts of the water transfers described in the Key Terms. By modeling the baseline demands without the water transfers and the demands for the action alternatives with the water transfers, the DEIS has effectively evaluated the combined impacts of the interim surplus criteria and the water transfers. IID believes that the impacts of the interim surplus criteria should be isolated by using the same demands for the baseline conditions and for the action alternatives. The demands should include both the interim surplus criteria and water

4: Comment noted.

5: The Pacific Institute Proposal was considered but not analyzed as an alterantive in this FEIS. See responses to Comment 11-2 and 11-6.

6: Comment noted.

7: All alternatives analyzed in the FEIS assume implementation of the California Colorado River Water Use Plan and intrastate water transfers. See response to Comment 37-11 for more detail.

transfers, and should apply to both baseline and action alternatives. The impacts of each of the water transfers described in the Key Terms will be evaluated in separate environmental reviews, as appropriate.

cont'd

In summary, IID believes that the impacts of the Interim Surplus Criteria should be analyzed using the same demands for both baseline conditions and the action alternatives. This will help ensure that the impacts of the proposed interim surplus criteria are evaluated correctly. In addition, IID urges Reclamation to seriously consider IID's comments as to the applicability of both NEPA and the ESA to this process as it relates to resources or species in Mexico.

IID appreciates the opportunity to comment on the DEIS.

Sincerely,

JOHN R. ECKHARDT, Ph.D., P.E.
Assistant to the General Manager

JRE/th
U:\SC\DEIS-Comments.doc

Copy: Gerald Zimmerman, CRB
Dennis Underwood, MWD
Tom Levy, CVWD
Maureen Stapleton, SDCWA

IRRIGATION & ELECTRICAL DISTRICTS ASSOCIATION OF ARIZONA

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September 8, 2000

BC00-1800
4600

Ms. Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

Re: Comments on the Draft Environmental Impact Statement for Lower Colorado River Interim Surplus Criteria (ISC), 65 Fed.Reg. 42028 (July 7, 2000) and 65 Fed.Reg. 48531 (August 8, 2000)

Dear Ms. Harkins:

These comments are intended to supplement my oral comments given at the Public Hearing on this subject on August 24, 2000 in Phoenix, Arizona, which oral comments are incorporated by reference. We also endorse and support the comments that have been filed by the Colorado River Energy Distributors' Association and the oral comments and written comments provided by the Arizona Power Authority Commission, the Arizona Department of Water Resources and the Central Arizona Water Conservation District.

These comments will deal with two subjects; the comment period and late comments, the preferred alternative, power impacts, and the extraterritorial application of the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA).

COMMENT PERIOD

1 At the hearing in Phoenix, there was some discussion about the need for acquisition of additional information and additional comments. After the original notice of availability and the availability of the Draft Environmental Impact Statement (DEIS), the seven Basin states proposed an alternative not included in the DEIS. That alternative was published in the Federal Register on August 8, 2000 and has since undergone some additional modification. The question arose whether the Bureau of Reclamation (Reclamation) could accept additional comments and information after the close of the comment period on September 8, 2000. The simple answer to that question is yes. Commenting is covered by the Council on Environmental Quality (CEQ) regulations

SERVING ARIZONA SINCE 1962

1: Consultation and coordination is an ongoing process during the preparation of an EIS. Reclamation is aware of the regulations and guidance you cite, and makes every reasonable effort to include and respond to late comments from regulatory agencies. To the extent possible, Reclamation also includes other substantive comments received after the close of the public comment period for the DEIS.

cont'd

at 40 C.F.R., Part 1503. While the regulations in that part do not specifically address the question of comments received after the expiration of a comment period set under 40 C.F.R. § 1501.8, the regulations do anticipate that all substantive comments received will be attached to the Final Environmental Impact Statement (FEIS) and those meriting response will be included in the responses in the FEIS. The clear implication is that substance will control over form and that information received prior to the completion of the FEIS should be included in the process. Additionally, the Department of Interior Manual, at 516 DM 4.17, says

"B. When other commenters are late, their comments should be included in the final EIS to the extent practicable."

And the Bureau of Reclamation Handbook, paragraph 8.15.2.4 contains a similar requirement.

Thus, additional information and comments can be obtained by Reclamation for the FEIS. It would be important to have that material in writing so it can be included with the FEIS, as required by 40 C.F.R. § 1503.4(b).

PREFERRED ALTERNATIVE

2

In the FEIS, Reclamation must designate a preferred alternative. 40 C.F.R. § 1502.14(e). That should be the seven-state alternative articulated in the August 6, 2000 Federal Register notice as further modified and discussed at the Phoenix hearing and, we presume, the other hearings. NEPA is a planning process and the EIS a planning analysis document focused on environmental consequences to a proposed action and reasonable alternatives. As such, it is perfectly positioned to make the sort of adjustments necessary that are called for here in order for the seven-state alternative to be the preferred alternative in the final EIS. See Answer to Question 29b., 40 Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations. Indeed, the dialogue necessary to refine the seven-state alternative as the preferred alternative enhances the quality of the NEPA process by clarifying the proposed action and allowing the environmental analysis of it to be more discrete and comprehensive.

POWER IMPACTS

3

Without belaboring comments you have already received and other comments you are receiving on this subject, from the Arizona Power Authority, the Colorado River Energy Distributors' Association and others, let me focus on the cure to the

2: The preferred alternative in this FEIS is derived from the Seven State Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need for the proposed action, Reclamation policy and operational procedures.

3: Comment noted. Reclamation believes that the level of analysis for energy resources presented in the EIS appropriately identifies the potential effects of interim surplus criteria compared with baseline conditions.

cont'd

inadequacies of Section 3.10 on energy resources in Chapter 3 on Affected Environment and Environmental Consequences. You must agree that the oversimplified discussion in this section does not pass the pink-face test. This region of the country is no longer capacity rich nor is it in a surplus condition with regard to energy, especially in summer months. If such surpluses existed, the 13 merchant plants being built in Arizona, or at least planned, would not even be being discussed. Nor would power bills have tripled this summer in San Diego. To correct the deficiencies in impact analysis on customers of the affected hydropower resources and the total lack of analysis of reliability impacts, I suggested to you at the hearing and I will repeat the suggestion that you reach out to the Western Systems Coordinating Council, the Colorado River Energy Distributors' Association, the Arizona Power Authority and other power customer organizations, including ours, for information on impacts that can be incorporated in the final EIS. Others have already volunteered to assist and we do likewise. These impacts must be quantified because the EIS is totally devoid, as are all of the action proposals, of any discussion of compensating those who will lose benefits from lost hydropower production and are not in a position to enjoy any of the benefits of water supply in return during times of shortage. One cannot ignore the class of beneficiaries of the hydropower projects involved that make this single source of benefit from these multi-purpose hydropower projects, i.e., hydropower.

EXTRATERRITORIAL APPLICATION OF NEPA

I. It is inappropriate and unnecessary to include an analysis of impacts to the Mexican Delta in the ISC EIS.

A. There is a strong presumption against extraterritorial application of statutes.

4

"It is a longstanding principle of American law 'that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.' ... This 'canon of construction ... is a valid approach whereby unexpressed congressional intent may be ascertained.'" EEOC v. Arabian American Oil Co. ("Aramco"), 499 U.S. 244, 248 (1991) (quoting Foley Bros. v. Filardo, 336 U.S. 281, 285 (1949)).

"The general and almost universal rule is that the character of an act as lawful or unlawful must be determined wholly by the law of the country where the act is done... [This] would lead, in case of doubt, to a construction of any statute as intended to be confined in its operation and effect to the territorial limits over which the lawmaker has general and legitimate power."

4: The applicable guidance appears to be contrary to your comment. EO 12114, Environmental Effects Abroad of Major Federal Actions, 44 FR 1957, 1979 WL 25866 (Pres.) requires that Federal agencies "... consider the significant effects of their actions on the environment outside the U.S., its territories and possessions,..." Recent CEQ guidance for transboundary impacts, dated July 1,1997, appears consistent with the approach in the Executive Order.

cont'd

American Banana Co. v. United Fruit Co., 213 U.S. 347, 356, 357 (1909).

The presumption against extraterritorial application is expressed most clearly by the holding in Aramco, 499 U.S. 244 (1991). The Aramco Court applied the presumption to Title VII, concluding that the statute did not apply to employment discrimination by an American company against an American citizen that occurred beyond U.S. boundaries. Despite the argued evidence that Congress intended Title VII to apply extraterritorially (i.e., Congress' specific reference which exempted employers "with respect to the employment of aliens outside any State" 42 U.S.C. 2000e-1 (1988)), Chief Justice Rehnquist held that only a "clear statement" in the language of the statute would be sufficient to overcome the presumption. 499 U.S. at 258.

Congress subsequently amended Title VII to overcome the result in Aramco. See 42 U.S.C. 2000e(f) (1994); id. 2000e-1(c); and id. 2000e-1(b). However, this does nothing to the presumption as declared by Chief Justice Rehnquist. In fact, Congress' action in this instance highlights three of the six (see II.F., post) sound policy reasons for the presumption. They are (1) the presumption provides legislators with a clear rule which allows them to predict the application of their statutes; (2) "the commonsense notion that Congress generally legislates with domestic concerns in mind," (Smith v. United States, 507 U.S. 197, 204 (1993)); and (3) separation-of-powers concerns (i.e., determination of how to apply federal legislation as beyond the constitutional scope of the judicial branch).

Furthermore, the Supreme Court has recently applied the presumption against extraterritoriality not only to Title VII, but also to the Foreign Sovereign Immunities Act, the Federal Tort Claims Act, the Immigration and Nationality Act, and, in a concurring opinion, Justice Stevens applied it to the Endangered Species Act. See Argentine Republic v. Amerada Hess Shipping Corp., 488 U.S. 428, 440-41 (1989); Smith v. United States, 507 U.S. 197, 203-04 (1993); Sale v. Haitian Centers Council, Inc., 509 U.S. 155, 173-74 (1993); and Lujan v. Defenders of Wildlife, 504 U.S. 555, 585-89 (1992), respectively. In Smith, Chief Justice Rehnquist applied the presumption again noting that it requires "clear evidence of congressional intent." 507 U.S. at 204. Similarly, in Sale, the Court held that Acts of Congress "do not have extraterritorial application unless such an intent is clearly manifested." 509 U.S. at 188. Therefore, in order to rebut the presumption against extraterritoriality, the statute must reflect the clear intent of Congress to do so. Language subject to varied interpretation is not sufficient. Aramco, 499 U.S. 244, 266-78 (1991).

Ms. Jayne Harkins
September 8, 2000
Page 5

B. NEPA does not cover actions taken in other sovereign nations.

The issue of whether NEPA may be applied extraterritorially has yet to come before the Supreme Court of the United States. However, as noted above, there is a strong presumption against extraterritorial application of statutes, which includes NEPA, unless Congress clearly expresses otherwise. Aramco, 499 U.S. 244, 248 (1991). A review of the lower courts' case law supports applying this presumption to NEPA.

Three cases are most instructive in concluding that NEPA should have no extraterritorial application here. The first is Natural Resources Defense Council, Inc. v. Nuclear Regulatory Comm'n ("NRDC"), 208 U.S. App. D.C. 216, 647 F.2d 1345 (D.C. Cir. 1981). NRDC concerned nuclear shipments to the Phillipines, to which the court held that "NEPA does not apply" extraterritorially. Id. at 1366. While limited to nuclear export licensing decisions, the court explained "NEPA's legislative history illuminates nothing in regard to extraterritorial application." Thus, in the absence of any "clear evidence of congressional intent" the presumption against extraterritoriality will prevail. Smith v. United States, 507 U.S. 197, 204 (1993).

5

The second case regarding the extraterritoriality of NEPA is Environmental Defense Fund v. Massey ("EDF"), 300 U.S. App. D.C. 65, 986 F.2d 528 (D.C. Cir. 1993). The court in EDF held that the presumption did not apply and consequently NEPA did apply to the National Science Foundation's attempt to incinerate food wastes in Antarctica. However, the court relied heavily, if not entirely, upon Antarctica's sovereignless status and the potential "clashes between our laws and those of other nations." Id. at 532.

Most importantly, the court limited its holding to the specific facts of that case and did "not decide today how NEPA might apply to actions in a case involving an actual foreign sovereign..." Id. at 837. And EDF also preceded Chief Justice Rehnquist's reaffirmation in Smith, 507 U.S. at 204: "The presumption is rooted in a number of considerations, not the least of which is the commonsense notion that Congress generally legislates with domestic concerns in mind." Thus, the EDF holding is limited to its unique facts.

The third case that addresses extraterritorial application of NEPA also addresses the holding in EDF. In NEPA Coalition of Japan v. Aspin ("Aspin"), the court distinguished EDF, stating, "The [EDF] court expressly limited its ruling by refusing to decide whether NEPA might apply to actions involving an internationally recognized sovereign power." 837 F.Supp. 466, 467 (1993) (citing EDF, 986 F.2d at 537). The Aspin case asks whether NEPA requires the Department of Defense to prepare an EIS

5: NEPA does cover actions taken in the United States. The Executive Order 12114 is used to provide the decisionmaker complete information regarding the impact of the decision (See Section 1-1 of the EO in Attachment B). Additional guidelines on the applicability of NEPA to transboundary impacts that may occur as a result of proposed federal actions in the United States are contained in a memorandum prepared by the Executive Office of the President, Council on Environmental Quality. A copy of this document (CEQ Guidance on NEPA Analyses for Transboundary Impacts - July 1, 1997) is also provided in Attachment B.

cont'd

for military installations in Japan. The court held that "the presumption against extraterritoriality not only is applicable, but particularly applies in this case because there are clear foreign policy and treaty concerns involving a security relationship between the United States and a sovereign power." 837 F. Supp. at 468. A similar result not involving a treaty was reached in Greenpeace, USA v. Stone, 748 F.Supp. 749 (D. Hawaii 1990), appeal dismissed as moot, 924 F.2d 175 (9th Cir. 1991).

Therefore, because of the above-cited case law, NEPA remains subject to the presumption against extraterritoriality in other sovereign nations.

C. The Treaty implications here require restraint.

1. Water deliveries are not the only Treaty matters that can be impacted.

6

Treaty relations and relationships will be impacted even if water deliveries are not.

"[The] presumption [against extraterritorial application] has special force when we are construing treaty and statutory provisions that may involve foreign and military affairs for which the President has unique responsibility." Sale v. Haitian Centers Council, Inc., 509 U.S. 155, 188 (1993) (quoting United States v. Curtiss-Wright Export Corp., 299 U.S. 304 (1936)).

The DEIS states that treaty water deliveries to Mexico (1.5 MAF/year) will not be affected by the implementation of the ISC. Chapter 3, Subsection 3.16.3. However, availability of treaty surplus water is specifically excluded from the DEIS. Chapter 1, Subsection 1.1.4. That, in and of itself, impacts relationships governed by the 1944 U.S./Mexico Treaty and Minute 242. It is literally impossible to assess impacts in Mexico, presumably in the Mexican Delta, without affecting relationships in Mexico, including relationships with the Mexican government. What sort of separate consultations with the Mexican government through the International Boundary Water Commission (IBWC) result from IBWC cooperating agency status? Conduct of studies? Peer review? Where does it stop?

2. If there are no treaty water delivery impacts, then there is even less reason to invade Mexican sovereignty, especially for blatantly speculative analysis purposes.

7

Since water is the sine qua non for Mexican Delta impacts, if no changes in treaty water deliveries will result, an impact analysis is irrelevant, worthless, and a waste of scarce federal funds. Continued compliance with the treaty is the only relevant subject. Since that is a given, nothing else remains to be done.

6: Reclamation agrees. See Chapter 5 for further information regarding consultation with Mexico.

7: See response to Comments 22-4 and 22-5..

cont'd

The DEIS notes that its analysis is keyed to the availability of "excess" water. However, the DEIS acknowledges that Mexico has no obligation to allow such water to flow through the Delta. Subsection 3.16.2. Indeed, the DEIS assumes consumptive use of such water. Ibid. Then the DEIS blithely goes on to model and discuss excess flows that are presumed to be targets of consumptive use demands as if they will flow through the Delta. This is sheer speculation and not required under NEPA. Environmental Defense Fund, Inc. v. Hoffman, 566 F.2d 1060 (8th Cir. 1977); Life of the Land v. Brinegar, 485 F.2d 460 (9th Cir. 1973); Forty Most Asked Questions, No. 18.

8

D. Executive Order 12114 does not support extraterritorial NEPA application.

E.O. 12114 is cited as support for extraterritorial NEPA analysis. It cannot support studying the impacts of the ISC in Mexico for three reasons. First, it predates all of the relevant case law which contradict its basic premise, including NRDC and Aspin, as well as Smith, Sale, etc. Second, it exempts actions not having significant effect outside the United States. Third, it exempts "actions taken...pursuant to the direction of [a] Cabinet officer when the national...interest is involved..." i.e., when a treaty is implicated.

9

E. The memorandum entitled "Council on Environmental Quality Guidance on NEPA Analyses for Transboundary Impacts" does not justify extraterritorial NEPA application where, as here, a treaty is clearly implicated.

The CEQ Memorandum itself mentions that the scoping process should eliminate transboundary analyses if the information is not needed. Thus, here it would exclude Section 3.16 itself. But to the extent Reclamation relies on this document, we hasten to point out its two fatal flaws. First, it totally disregards the presumption against extraterritorial application. Second, it totally avoids discussion of applications of NEPA where treaty relationships are involved. Since the document recognizes that it has no force beyond existing case law, it provides no support here in the face of NRDC and Aspin.

EXTRATERRITORIAL APPLICATION OF ESA

12. ISC decisions cannot be based on analysis of ESA-related impacts, if any, to the Mexican Delta resulting from river operations conducted pursuant to the ISC.

8: See response to Comment 22- 4.

9: Reclamation notes that the cited CEQ guidance memorandum does not provide exemptions based on instances where treaties exist.

A. Using the EIS to examine extraterritorial impacts to endangered and threatened species is extraterritorial application of the ESA.

10 By definition, any analysis which accounts for potential impacts beyond our borders necessarily is applying the Endangered Species Act extraterritorially. See: Lujan v. Defenders of Wildlife, 504 U.S. 555, 585-89 (1992) - Stevens, J., concurring in the judgment. Using a Mexican Delta endangered and threatened species analysis as part of the EIS extends the force of the ESA across the Southern International Border with Mexico, when that analysis is presented to the decision-maker, here the Secretary of the Interior.

11 B. There is a strong presumption against extraterritorial application of statutes absent clearly expressed Congressional intent. [See I.A., supra.]

C. Section 7(a)(2) of the Endangered Species Act lacks any Congressional intent to apply these provisions extraterritorially.

1. Section 7(a)(2)'s silence on extraterritorial application requires a contrary conclusion.

In his concurring opinion, Justice Stevens addressed this precise point. He stated, "[T]he absence of any explicit statement that the consultation requirement is applicable to agency actions in foreign countries suggests that Congress did not intend that 7(a)(2) apply extraterritorially." Lujan v. 12 Defenders of Wildlife, 504 U.S. at 588 (1992). The only geographic reference in Section 7(a)(2) is "affected States" as it applies to critical habitat. Clearly, Section 7(a)(2) lacks any explicit reference to application in foreign countries and thus, Congress did not intend that it apply extraterritorially.

Moreover, in reviewing Title VII, the Court held that vague references such as "outside any State" were not sufficient to apply that statute extraterritorially. Aramco, 499 U.S. at 258. Thus, if written, albeit vague, references were not enough to warrant an expression of Congressional intent, surely silence on extraterritorial application must also fail.

2. Section 7's silence reflects Congressional intent.

13 As noted by Justice Stevens concurring opinion in Lujan v. Defenders of Wildlife, Sections 8 and 9 of the Endangered Species Act specifically address application of these sections abroad. 504 U.S. at 588. Section 7 does not. Thus, Congress clearly knew how to draft extraterritorial application of ESA provisions,

10: ESA consultation on this domestic action was completed between Reclamation and the Service and NMFS as directed by the Department of Interior Solicitor and the Commissioner of Reclamation. There is no final resolution of the legal question of application of the ESA to extraterritorial impacts. Reclamation and the Department recognize that this consultation may provide more information than the law requires. However, doing so provides the Secretary a better basis for his determinations and a better understanding of potential impacts.

11: Comment noted.

12: Comment noted.

13: Comment noted.

cont'd | yet chose not to in Section 7. As reasoned above, this absence of Congressional intent necessarily must yield to the presumption against extraterritorial application of statutes.

D. Fish and Wildlife Service's own regulations prevent extraterritorial application.

1. The 1986 changes in the regulations specifically limited application of ESA.

The scope of the ESA is expressed, in pertinent part, as follows:

"Section 7(a)(2) of the [ESA] requires every Federal agency, in consultation with and with the assistance of the Secretary, to insure that any action it authorizes, funds or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species." (Emphasis added.) 50 C.F.R. § 402.01.

14 | The Secretary of the Interior and the Secretary of Commerce have consistently taken the position that they need not designate critical habitat in foreign countries. See 42 Fed. Reg. 4868 (1977)(initial regulations of the Fish and Wildlife Service ("F&WS") and the National Marine Fisheries Service ("NMFS")).

Conversely, in 1978 the F&WS and NFS promulgated a joint regulation stating that the obligations imposed under § 7(a)(2) extend abroad. However, almost immediately the Department of the Interior began to reexamine its position. Consequently, in 1983 a revised joint regulation, reinterpreting 7(a)(2) to require consultation only for actions taken in the United States or on the high seas, was proposed (48 Fed.Reg. 29990) and in 1986, promulgated (51 Fed.Reg. 19926; 50 C.F.R. 402.01 (1991)).

That this restriction applies to effects as well as actions must follow for it would prove "illogical to conclude that Congress required federal agencies to avoid jeopardy to endangered species abroad, but not destruction of critical habitat abroad." Lujan, 504 U.S. 555, 588.

This analysis is confirmed by the concomitant restrictive language in the definition of "action", in pertinent part, as:

"All activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." (Emphasis added.) 50 C.F.R. § 402.02.

15 | 2. Agency construction of the Act was clearly expressed in the 1986 rulemaking.

14: Comment noted.

15: Comment noted.

cont'd

One need look no further than the F&WS explanation in its 1986 rulemaking for clear intent that the ESA's operative provisions are not to be applied extraterritorially.

> "The 1978 rule extended the scope of section 7 beyond the territorial limits of the United States to the high seas and foreign countries. The proposed rule cut back the scope of section 7 to the United States, its territorial sea, and the outer continental shelf, because of the apparent domestic orientation of the consultation and exemption processes resulting from the Amendments, and because of the potential for interference with the sovereignty of foreign nations. Several commenters asserted that the rules should continue to have extraterritorial effect. The scope of these regulations has been enlarged to cover Federal actions on the high seas but has not been expanded to include foreign countries." 51 Fed.Reg. 19929-19930 (1986).

The F&WS has interpreted Congressional amendments to the ESA for over a decade as evincing an intent for domestic application. The F&WS is bound by its own longstanding administrative interpretation and so is Reclamation.

16

B. Using an analysis of extraterritorial impacts, Reclamation effectively applies § 7(a)(2) extraterritorially, which is unlawful.

Because Section 7(a)(2) does not demonstrate any [illegible] clear, Congressional intent concerning their foreign application, under the presumption against application of statutes, Section 7(a)(2) must be confined to application within the United States. Inserting the ESA analysis in the EIS, Subsection 3.16.6, coupled with consultation with [illegible], Subsection 3.16.3, constitutes preparation of a de facto Biological Assessment under the ESA. Thus, this analysis of extraterritorial impacts is an impermissible application of the ESA.

17

F. Sound public policy demands that ESA application remain focused on impacts in the United States where, as here, a treaty covers the area in question.

There are six oft-cited reasons for the presumption against extraterritorial application. (1) The presumption provides legislators with a clear background rule which allows them to predict the application of their statutes; (2) "the commonsense notion that Congress generally legislates with domestic concerns in mind" (Smith, 507 U.S. 197, 204 (1993)); (3) Separation-of-powers concerns (i.e., the determination of whether and how to apply federal legislation to conduct abroad raises difficult and sensitive policy questions that tend to fall outside both the

16: Comment noted.

17: Comment noted. Reclamation acknowledges there are various sound public policy perspectives on this issue. Reclamation has appropriately focused on its ESA compliance within the United States.

cont'd

institutional competence and constitutional prerogatives of the judiciary); (4) international law limitations on extraterritoriality, which Congress should have been assumed to observe; (5) consistency with domestic conflict-of-laws rules; and (6) the need to protect against unintended clashes between our laws and those of other nations which could result in international discord. See, Dodge, "Understanding the Presumption Against Extraterritoriality," 16 Berk. J. Int'l Law 85 (1998).

1. Treaty relations and relationships will be impacted even if water deliveries are not. [See I.C.J., supra.]

2. Hydrologic impact would most likely result if extraterritorial impacts colored the decision.

It is difficult to imagine how a decision-maker, let alone the preparers of the EIS, will not be influenced by impact analysis in the Mexican Delta. Even if water deliveries are not impacted, some hydrologic, water quality or other changes will result from merely weighing the information. To think otherwise is to defy common sense. Treaty relations will be affected. Section 3.16 should be deleted from the FEIS.

Thank you for the opportunity to comment on this important proposal.

Sincerely,

Robert S. Lynch
Asst. Secretary/Treasurer

RSL:psr
cc: Hon. Jane Dee Hull, Governor of Arizona
Arizona Congressional Delegation
IEDA Board of Directors
John Leshy, Solicitor, Department of the Interior
Rita Pearson, Director, Arizona Department of Water Resources
Gerald Zimmerman, Executive Director, Colorado River Board of California
George M. Caan, Director, Colorado River Commission of Nevada
Wayne Cook, Executive Director, Upper Colorado River Commission

Harold Simpson, Colorado State Engineer
Larry Anderson, Director, Utah Division of Water Resources
Philip Mutz, New Mexico Interstate Stream Commission
John Shields, Wyoming State Engineer's Office
Douglas Miller, General Counsel, CAWCD
Douglas Fant, Counsel, AFA
Leslie James, Executive Director, CREDA
Larry Dozier, Deputy General Manager, CAWCD

SEP. 8.2000 3:38PM MWD NO.236 P.2

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

September 8, 2000

Mr. Robert W. Johnson
Regional Director
Lower Colorado Region
c/o Ms. Jayne Harkins, BC00-4600
U.S. Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

VIA FACSIMILE

Dear Mr. Johnson:

Comments on Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

The Metropolitan Water District of Southern California (Metropolitan) appreciates the opportunity provided by the U.S. Bureau of Reclamation (Reclamation) to comment on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement (DEIS). Metropolitan has reviewed the DEIS in conjunction with the information submitted on the DEIS which was published in the Federal Register on August 8, 2000 on pages 48537 to 48538 (Information), and the August 14, 2000 memorandum making available Attachment 1 for the DEIS.

Metropolitan notes that Reclamation has made a preliminary review of information submitted on the DEIS, entitled, "Interim Surplus Guidelines—Working Draft", which is the product of significant effort on the part of the representatives of the Governors of the Colorado River Basin States and has made a preliminary determination that such criteria are within the range of alternatives and impacts analyzed in the DEIS. Metropolitan encourages Reclamation to complete the final evaluation of the information, and supports the presentation of the results of that final evaluation in the Final Environmental Impact Statement (FEIS). Metropolitan supports the designation of the "Interim Surplus Guidelines—Working Draft" as the preferred alternative in the FEIS.

1

One of the comments made at the August 24 public hearing in Phoenix, Arizona indicated that Reclamation had ample authority to participate in a dialogue on the "Interim Surplus Guidelines—Working Draft" during the remainder of the NEPA process. As a potentially affected public agency, Metropolitan requests the opportunity to be invited to participate in any such dialogue.

2

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with Reclamation policy and operational procedures.

2: Reclamation appreciates the willingness of state and local agency representatives to participate in a dialogue on the interim surplus criteria during the NEPA process. This has been of assistance in compiling water demand projections and other operational aspects for the analysis.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Mr. Robert W. Johnson, Regional Director
Page 2
September 8, 2000

Enclosed for your consideration are additional comments on the DEIS. Should you have any questions on Metropolitan's comments, I may be reached at (213) 217-6588.

Very truly yours,

Dennis B. Underwood
Senior Executive Assistant to the General Manager

JPM:mm
o:\clustr10\committees\correst\Comments on Interim Surplus Criteria DEIS.doc

Enclosure

SEP. 8.2008 3:39PM MWD NO.236 P.4

Additional Comments on
Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

The following comments are offered for consideration by the Bureau of Reclamation (Reclamation) for inclusion in the Final Environmental Impact Statement:

1. Insert the word "normal" before the word "apportionment" as California has not been diverting more than its normal and surplus apportionment combined. (Page 1-3, paragraph 4, line 1)

2. Insert the phrase "beneficial consumptive use of" before the word "water" as Article III of the Colorado River Compact apportioned the beneficial consumptive use of water between the Upper and Lower basins. (Page 1-8, point 1, line 1)

3. Insert the phrase "authorized the Lower Division states to enter into an agreement apportioning the", and delete the word "apportioned" before the word "water" to more precisely state what was authorized by the Boulder Canyon Project Act. After the word "water" delete the phrase "among the Lower Division States". (Page 1-8, point 2, lines 2-3)

4. Insert the word "Protection" after the word "Floodway" to more precisely reference the short title of Public Law 99-450, the Colorado River Floodway Protection Act. (Page 1-20, paragraph 5, line 1) Insert the phrase "from below Davis Dam to the Southerly International Boundary between the United States and Mexico" following the word "greater" to specify the location of the floodway. (Page 1-20, paragraph 5, line 3)

5. Delete the sentence "The Colorado River Floodway Act requires that the minimum flood release from Hoover Dam can be no less than 40,000 cfs." as Metropolitan's review of Public Law 99-450 did not reveal this requirement. (Page 1-20, paragraph 5, lines 3-5)

6. Is the Lower Basin apportionment referenced, the Lower Basin normal apportionment or the Lower Basin normal and surplus apportionment? (Page 1-20, paragraph 1, line 5)

7. It is stated that "Elevation 1083 feet msl is the minimum water level for power generation at the Hoover Powerplant based on its existing turbine configuration." (Page 3.3-10, Section 3.3.3.4, lines 6-8) In Reclamation, River Operations Team, Boulder City, Nevada's, "CRSSez Annual Colorado River System Simulation Model, Overview and Users Manual", Revised May 1998, it is stated that "If mavgelev is less than 1050 feet then Hoover energy is zero." where mavgelev is Mead average elevation for the year. (Page 13, paragraph 5, lines 8-9) In the Draft Environmental Impact Statement (DEIS), it is stated "The minimum water surface elevation for efficient power generation is 1083 feet." (Page 3.3-23, paragraph 1, lines 4-5) Please clarify whether the word

-1-

3: Comment noted, the change has been made.

4: The suggested edit was included in the FEIS.

5: The suggested edit was included in the FEIS.

6: Your comment is noted. This paragraph has been deleted. Section 3.6.4.1 has more information regarding Public Law 99-450.

7: Your comment is noted. This paragraph has been deleted.

8: Reclamation assumes this comment is referring to page 1-22, paragraph 1, line 5 of the DEIS. The sentence has been changed.

9: The fifth sentence of the first paragraph in Section 3.3.3.4 has been changed to read as follows: "Elevation 1083 feet msl is the minimum water level for effective power generation at the Hoover Powerplant based on its existing turbine configuration." A quantitative definition for "effective" as it is used in connection with power generation has been added to Section 3.10.2.1.

SEP. 8.2000 3:40PM MWD NO.236 P.5

cont'd "efficient" should be inserted before "generation" in the sentence quoted above which is on Page 3.3-10. Please provide a quantitative definition for "efficient" as it is used in connection with generation on pages 3.3-10, 3.3-23, and Figure 3.3-10.

10 8. Insert the phrase "the Yuma Project," before the phrase "the IID" as the All American Canal delivers water to the Yuma Project as well as IID and CVWD according to http://datasweb.usbr.gov/html/allamcanal.html#general. (Page 3.4-6, paragraph 4, line 8)

11 9. Revise the phrase "Since 1996" to "In 1996 and 1997"; and insert the phrase "normal apportionment" and delete the word "entitlement" before the phrase "due to determinations by the Secretary" to be more precise. Reclamation's annual report entitled, "Compilation of Records in Accordance With Article V of the Decree of the Supreme Court of the United States in Arizona v. California Dated March 9, 1964" indicates that California's net diversions of Colorado River water totaled about 100,000 to 200,000 acre-feet less in 1998 and 1999 than that indicated in the DEIS. (Page 3.4-7, paragraph 1, line 3)

12 10. Insert the word "normal" before the word "apportionment" to be more precise. (Page 3.4-7, paragraph 3, line 1).

13 11. Revise the word "entitlement" to the phrase "normal apportionment" to be more precise. (Page 3.4-7, paragraph 3, line 3).

14 12. The DEIS includes the phrase "for about 700,000 acre-feet of the approximate 2 million af of water that MWD currently delivers." (Page 3.4-7, paragraph 3, lines 6-7) In calendar year 2000 with the initial filling of Diamond Valley Lake, Metropolitan forecasts total deliveries of 2.7 million acre-feet to its service area, for Hayfield groundwater basin, and to Desert Water Agency and Coachella Valley Water District for recharge of the Upper Coachella groundwater basin under agreements with those two agencies, with 1.4 million acre-feet of the total being delivered from the State Water Project. Over the calendar year period 1990-99, Metropolitan delivered between 1.5 and 2.6 million acre-feet.

15 13. Revise the word "legal" to the word "normal" to be more precise. (Page 3.4-8, paragraph 2, line 2).

16 14. Revise the number "5.3" to "5.2". (Page 3.4-8, paragraph 3, line 2) Reclamation's annual report entitled, "Compilation of Records in Accordance With Article V of the Decree of the Supreme Court of the United States in Arizona v. California Dated March 9, 1964" indicates that California's net diversions have not reached 5.3 million acre-feet in the last 10 years after accounting for unmeasured return flows.

17 15. Insert the phrase "those in place by" before the number "2015" (Page 3.5-7, paragraph 2, line 3) as the sixth paragraph on this page includes this language.

-2-

10: The suggested edit was made.

11: The last sentence of the fifth paragraph in Section 3.4.3.3 has been changed to read as follows - Since 1996, California has received as much as 800,000 af above its annual 4.4 maf normal apportionment due to determinations by the Secretary of surplus conditions on the Colorado River through the AOP process.

12: The suggested edit was made.

13: The suggested edit was made.

14: The last part of the last sentence of the seventh paragraph in Section 3.4.3.3 has been revised to reflect the information provided.

15: The suggested edit was made.

16: The suggested change was made.

17: The referenced paragraph has been removed from the document.

SEP. 8.2000 3:41PM MWD NO.236 P.6

16. Considering the data presented in Table 3.5-7, revise the word "almost" to "about" and revise the phrase "California Alternatives" to "Alternative". (Page 3.5-24, paragraph 4, lines 4-5)

17. Revise the sentences, "The Tribe maintains a claim to additional lands and reserved water rights in California, which will likely be settled soon recognizing the Tribe's right to additional reserved water rights from the Colorado River in the amount of 3,022 acre-feet. The Tribe and State of California have agreed upon a settlement of that claim which is presently before the US Supreme Court for settlement." to "In its June 19, 2000 Opinion, the US Supreme Court accepted the Special Master's uncontested recommendation and approved the proposed settlement of the dispute respecting the Fort Mojave Indian Reservation. Under the settlement the Tribe is awarded the lesser of an additional 3,022 acre-feet of water or enough water to supply the needs of 468 acres." (Page 3.14-7, paragraph 3, lines 18-23) Revise the phrase, "The attached tables incorporate the proposed" to "The above tables incorporate the". (Page 3.14-7, paragraph 3, line 23)

18. In Table 3.14-1, in row 11 labeled "M&I Priority" please review the phrase "(should be 18,135)" with the values "18,145" in the columns "Likely Future without GRIC" and "With GRIC Settlement" for that row. In row 12 labeled "Indian Allocation (AkChin)(minus losses)" please review the "1`" found in the "With GRIC Settlement" column. (Page 3.14-12)

19. In Table 3.14-2 in the row labeled "Colorado River – Yuma Mesa and Wellton Mohawk", the columns from left to right "Likely Future without GRIC", "Total Water", and "With GRIC Settlement" show the value of "68,400". However, the next column to the right, "Total Water" shows a value of "64,800". It appears that this value should be "68,400" as it is the 68,400 value which when added to the second row value of "801,574" in the "With GRIC Settlement" column sums to "869,974" in the column to the right labeled "Total Water" in the second row. Should "CAGRD" in the fifth row label be "CAGRD", the acronym for the Central Arizona Groundwater Replenishment District? (Page 3.14-2)

20. It is stated that "At that elevation Lake Mead has a nominal 'live capacity' of 27,377,000 acre-feet and an active capacity of 17,353,000 acre-feet above elevation 1083 feet msl, the minimum elevation for power generation." (Attachment A, page 1, paragraph 3, line 8) It is also stated that "The minimum water surface elevation for efficient power generation is 1083 feet." (Page 3.3-23, paragraph 1, lines 4-5) Please clarify whether the word "efficient" should be inserted before "generation" in the sentence quoted above in Attachment A.

21. Revise the word "Protection" to "Policy". (Attachment H, Six States Alternative, page 2, paragraph 5, line 2) The same comment applies for the California Alternative, and the Shortage Protection Alternative.

-3-

18: Comment noted. This section has been revised to incorporate information resulting from modeling conducted for the FEIS.

19: We agree the second subparagraph under paragraph 3.14.2.6 needs to be revised to recognize the Supreme Court's recent opinion. However, in revising the paragraph, we relied primarily on the suggested rewording from the Ten Tribes Partnership. See response comment 53-14.

20: In Table 3.14-1, San Carlos Apache, M&I Priority, 18,145 acre-feet per year is listed as the M&I allocation under both the future with the GRIC settlement and the future without the GRIC settlement. This volume of water is based on the CAP Simulation Study and the draft EIS for the CAP Reallocation, dated June 2000. A note is provided in Table 3.14-1 stating that 18,135 AF per year is the volume of water which should be listed because that volume was allocated in the legislation. A footnote was written in the FEIS to explain the two numbers. The "1" in Table 3.14-1, San Carlos Apache, Indian Reallocation (Ak Chin) (minus losses), will be corrected to read "30,800".

21: The quantity and acronym have been corrected.

22: The sentence referred to is in Attachment C of the FEIS. It has been modified as suggested.

23: The correction will be made.

SEP. 8. 2000 3:41PM MWD NO. 235 P. 7

24 | 22. Revise "August-July" to "July-July". (Attachment I, Draft: Last Revision, August 28, 2000, page I-11, first table, row 7)

25 | 23. Please expand Table 6, "Hoover Dam Elevation and Output", Attachment N, to include elevations 1083 and 1050 feet.

24: This correction has been made.

25: Median reservoir elevations, which were used for the power analysis, remain above 1083 feet throughout the period of analysis. Therefore, elevations 1083 and 1050 feet were not included in the table.

4

09/11/2000 10:12 5206805430 LHC PD CTY ATTY PAGE 01

MOHAVE COUNTY WATER AUTHORITY
P.O. BOX 2419
BULLHEAD CITY, AZ 86430

FAX TRANSMITTAL LETTER
FAX NO. (520) 680-5430

DATE: September 11, 2000
NO. OF PAGES: 3 **(INCLUDING TRANSMITTAL LETTER)**

TO: Jayne Harkins
Bureau of Reclamation
FAX NO: (702) 293-8042

FROM: Maureen George
DEPT: OFFICE OF THE CITY ATTORNEY
TELEPHONE: (520) 453-4144

URGENT

SUBJECT: Comments on Draft EIS – Colorado River Interim Surplus Criteria

COMMENTS/INSTRUCTIONS: To follow is a REVISED letter to that of the one faxed to you on Friday, September 8. Please replace page 2 of the September 8 letter with the REVISED page two attached hereto. Thank you for your assistance.

CAUTION PLEASE FORWARD DOCUMENTS TO ADDRESSEE IMMEDIATELY UPON RECEIPT. THE INFORMATION CONTAINED IN THIS FACSIMILE MESSAGE IS CONFIDENTIAL AND INTENDED SOLELY FOR THE USE OF THE INDIVIDUAL OR ENTITY NAMED ABOVE. IF THE READER OF THIS MESSAGE IS NOT THE INTENDED RECIPIENT, OR THE EMPLOYEE OR AGENT RESPONSIBLE FOR DELIVERING IT TO THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION, COPYING OR UNAUTHORIZED USE OF THIS COMMUNICATION IS STRICTLY PROHIBITED.

09/11/2000 10:12 5206805430 LHC PD CTY ATTY PAGE 02

MOHAVE COUNTY WATER AUTHORITY
P.O. BOX 2419
BULLHEAD CITY, AZ 86430
(520) 754-2555
(520) 754-4622 (fax)

September 11, 2000

VIA FACSIMILE AND U.S. MAIL
(702) 293-8042

Regional Director
Lower Colorado Region
Attn: Jayne Harkins (LC-4600)
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

RE: Comments on the Draft Environmental Impact Statement (EIS) regarding Colorado River Interim Surplus Criteria, Colorado River Basin

Set forth below are the comments of the Mohave County Water Authority on the Draft EIS dated July 7, 2000, in regard to proposed Colorado River interim surplus criteria.

1 1. The Draft EIS fails to address in any meaningful way the increase in the relative risk of shortage to Arizona users, particularly broken down by category of user. This is a glaring omission of key information necessary for water users in Arizona to make a determination as to the impact of the interim surplus criteria.

2 2. The report fails to address the unresolved issue of the relative priority among fourth priority users in Arizona. Again, a key factor necessary for those holders of fourth priority rights in Arizona to make a determination as to the impact of the interim surplus criteria.

3 3. The EIS does not address the impact on existing contractors for fifth and sixth priority water. The Decree provides that Arizona is entitled to 46% of the water available in the surplus year. Either we are or are not in a surplus condition and, if we are, then those holders of surplus contracts, up to 46% in Arizona, are entitled to take such water on the basis provided in the Decree.

4 4. The EIS fails to address the fact that Arizona's apportioned but "unused" water may only be available because the Arizona Water Bank, pursuant to these interim guidelines and agreements with other states would, to the detriment of Arizona water users, agree to forebear taking water that would otherwise be banked in favor of CAP and other fourth priority users.

5 5. The report fails to address in any detail the reasoning behind Arizona going to 2.3 in years of shortage versus California taking its full priority. A related issue is the provision that a consequence of not complying with the cut back in usage to 4.4 million a/f (although the numbers would appear to be 4.8 million a/f) MWD shall be reduced to a maximum of 200,000 a/f per year even though they may have diverted millions of acre feet.

1: See responses to Comment 53-16 and 14-11 for discussions of depletion schedules and Arizona shortages.

2: See responses to Comment 53-16 and 14-11 for discussions of depletion schedules and Arizona shortages.

3: See responses to Comment 53-16 and 14-11 for discussions of depletion schedules and Arizona shortages.

4: As stated in Chapter 2 of the FEIS, the Secretary will continue to apportion water consistent with the applicable provisions of the Decree. The Secretary will also honor forebearance arrangements made by various parties for the delivery of surplus water or reparations for future shortages.

5: As described in Section 3.3.3.4, the magnitude of the shortage to CAP was strictly a modeling assumption. The Colorado River Basin Project Act provided California with a 4.4 maf priority over CAP diversions.

6 6. The only acceptable reparation is wet water, available in the shortage year when needed, up to the amount that would have been available but for any water diverted by California as a result of these interim guidelines.

7 7. The proposed interim guidelines provide for no reparation to Arizona for continued use of water beyond its allocation when such water will only be "available" if Arizona either declines to take its apportionment in order to assist California or, in the alternative, declines to take the surplus to which it is entitled. We are concerned that either of these actions would be a detriment to water users in Arizona, particularly those outside the CAP.

8 8. The report fails to address in any detail the practical bottom line, i.e., water use is going to continue to increase astronomically at the rate California is growing. There is little or no probability that water use will actually decrease to the 4.4 number without significant enforceable sanctions which certainly are not present in the proposed interim guidelines.

9 9. The report seems to indicate while there may be an increase in demand on the Colorado River, for example in Mohave and Yuma counties, such demand is many years out. This is not true. The Arizona Water Bank's recent study indicated Lake Havasu City, for example, will run out of water prior to the proposed expiration of these interim surplus guidelines. The Draft EIS makes no effort whatsoever to address the concerns of fourth priority mainstream river users as opposed to those in CAP.

10 10. The report states the Bank's primary purpose is to firm CAP supplies. This is not true. It has an equal obligation to firm the supplies of river communities. Our concern is that obligation would not be met if these interim surplus criteria are adopted.

11 11. The Draft EIS fails to take into consideration the cumulative impact on Colorado River main stem users in Arizona of the proposed interim surplus criteria, the other provisions of California's 4.4 Plan, the policy of Reclamation regarding the use of effluent on the river and the proposed reallocation of the CAP project water supply in conjunction with settlements of CAP and Indian water rights disputes.

12 Absent more information on the relative priorities among fourth priority users in Arizona, and the relative increased risk of shortage over time to the various classes of users in Arizona, the Mohave County Water Authority must object to any but the no action alternative.

Sincerely,

Maureen R. George

MAUREEN R. GEORGE
Secretary-Treasurer
Mohave County Water Authority

c: Mohave County Water Authority Board of Directors
Lake Havasu City Mayor and City Council
Bruce Williams, City Manager

6: See response to Comment 56-32, regarding reparations.

7: See response to Comment 56-32, regarding reparations.

8: See response to Comment 33-3.

9: See response to Comment 53-16 for a discussion of depletion schedules.

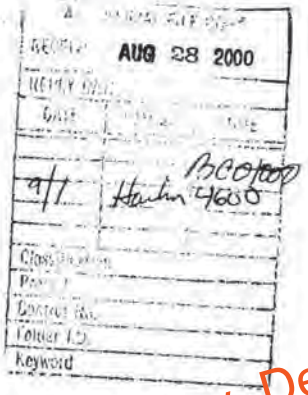
10: Comment noted. The evaluation of Arizona's groundwater banking programs is outside the scope of this project.

11: No cumulative impacts have been identified for the issues raised in this comment. Note that potential effects on water users in Arizona are identified in Section 3.4 of the EIS.

12: We have modified the reference to reductions in times of shortage in the third paragraph on page 3.4-15, to recognize that in Arizona a reduction in the amount of Colorado River water available to fourth priority users would be shared pro rata among CAP and non-CAP entitlement holders.

OURAY PARK IRRIGATION CO., INC.

HC 69 Box 127 - Randlett, Utah 84063-0092
Phone 435-823-7709 - Fax 435-545-2710



Ms. Jayne Harkins
P.O. Box 61470
Boulder City, Nevada 89006-1470

August 21, 2000

To Ms. Jayne Harkins:

1 As President of Ouray Park Irrigation Company which controls the water to approximately 12,000 acres in northeastern Utah, I would like to show support for the 7 Upper Colorado Basin states proposal. I would also like to encourage the Secretary of Interior to adopt this proposal as the preferred alternative in the final environmental assessment.

Thank you,

Shane Frost

Shane Frost
Ouray Park Irrigation Co. President
HC 69 Box 127
Randlett, Utah 84063

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

SEP 2000

SRP
Delivering More Than Power™

Mail Station ISB250
PO Box 52025
Phoenix AZ 85072-2025

BCOO/4600

September 8, 2000
VIA fax and US mail

Ms. Jayne Harkins
Bureau of Reclamation
Attn: BCOO – 4600
PO Box 61470
Boulder City, NV 89006-1470
(fax: 702-293-8042)

RE: COMMENTS ON DRAFT EIS ON COLORADO RIVER INTERIM SURPLUS CRITERIA

Dear Ms. Harkins:

Salt River Project (SRP) is an agricultural improvement district in the state of Arizona and through its electric utility operation serves over 750,000 electric utility customers. SRP purchases power produced by the Colorado River Storage Project (CRSP), Parker-Davis Project and the Boulder Canyon Project, and thereby has a direct and specific interest in the operation of the generation in the Colorado River and the draft EIS on Colorado River Interim Surplus Criteria.

1 SRP supports the comments submitted by the Colorado River Energy Distributors Assn. (CREDA) (attached).

Sincerely,

John Coggins
Manager, Supply & Trading

Cc: Leslie James, CREDA

1: Support of comments submitted by Colorado River Energy Distributors Association - comment noted.

San Diego County Water Authority
A Public Agency
3211 Fifth Avenue • San Diego, California 92103-5718
(619) 682-4100 FAX (619) 297 0511

SEP 20 2000

September 8, 2000

Regional Director, Lower Colorado Region
c/o Jayne Harkins (LC-4600)
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

1 This letter presents the Authority's comments on the Bureau of Reclamation's July 2000 Colorado River Interim Surplus Criteria Draft Environmental Impact Statement (DEIS). Surplus criteria are linked to other key elements of California's Colorado River Water Use Plan, including the Authority's core water transfer with the Imperial Irrigation District and the quantification of California's priority system for Colorado River water users. The implementation of appropriate surplus criteria is thus necessary to enable other critical programs for reducing California's demand on Colorado River water supplies above the state's basic apportionment.

The Authority supports and urges the Bureau to adopt and implement the surplus criteria guidelines proposed and presented by all seven Colorado River Basin states to the Department of Interior on July 27, 2000. The guidelines, which were published by the DOI as supplemental information to the DEIS, were the product of intensive review and study by all seven states over a period of several years. All seven states are in agreement that the guidelines will produce the interim surplus water needed by California, without creating unmitigated risk to Arizona or other lower division water users.

Because the surplus criteria are linked to other California Plan elements, it is essential that all elements move forward in a coordinated fashion. The seven states' proposal, for example, makes surplus guidelines effective only after the quantification settlement agreement becomes effective. Surplus guidelines are also a required condition for the Authority's water exchange agreement with the Metropolitan Water District, which is needed to transport up to 200,000 af of conserved agricultural water from the Imperial Valley to the Authority for future urban use. California's agencies have obligations to develop programs that offset demand for Colorado River water by specific dates. The guidelines contain benchmarks to ensure that California makes progress on developing the programs needed to reduce demand. If sufficient progress is not made, the surplus guidelines are subject to termination.

2 cont'd below Potential impacts from use of the seven states' surplus guidelines fall within the range of alternatives analysis contained in the DEIS. We believe no important parameter studied in Chapter 3 of the DEIS, Affected Environment and Environmental Consequences, would be outside the range of alternatives already reviewed. Computer modeling by the seven states has shown that impacts on reservoir system operation, reservoir elevations,

MEMBER AGENCIES

CITIES
IRRIGATION DISTRICTS
WATER DISTRICTS
MUNICIPAL WATER DISTRICTS
COUNTY
PUBLIC UTILITY DISTRICT
FEDERAL AGENCY

1: Comment noted.

2: Reclamation concurs with the position expressed in this comment with respect to the Basin State alternative included in this FEIS.

2 cont'd | and water supplies would likely fall in a bandwidth between modeling results from the "California" and "Six States" alternatives reviewed by the DEIS. The same result holds true for the remaining factors reviewed in this chapter, such as riverflow issues, aquatic resources, special-status species, recreation, and energy resources.

3 | The DEIS specifically requested comments regarding appropriate baseline criteria. While a case might be made for utilizing either the "75R" or "70R" strategy for baseline conditions, to in effect recreate recent Annual Operating Plan history, we feel the differences between the two strategies are too slight to be of any consequence for the comparison of surplus criteria alternatives. The choice is even less consequential after considering that the Secretary currently enjoys discretion to declare surplus based upon varying year-to-year water conditions, as noted in the DEIS. Neither strategy is fully capable of mimicking the recent history of surplus declarations. It should be noted that the seven states' surplus guidelines proposes using the "70R" strategy, both as a specified level of surplus during the interim period, and as the basis for surplus determinations after the interim period.

We appreciate the work the Bureau has done preparing the DEIS. Should you have any questions regarding the Authority's comments, please contact Mr. Dave Fogerson at 619-682-4153.

Sincerely,

Gordon A. Hess
Director of Imported Water

3: Reclamation has noted the comment regarding the relative roles of 70R and 75R strategies in portraying differences among alternatives. See response to Comment 57-11 for additional information.

SOUTHERN CALIFORNIA EDISON

September 8, 2000

4600

Mr. Robert W. Johnson
Regional Director, Lower Colorado Region
Attn: Jayne Harkins (LC-4600)
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

VIA FACSIMILE
(702) 293-8042

Comments to the Draft Environmental Impact Statement for the Colorado River Interim Surplus Criteria

Dear Mr. Johnson

By your letter dated Jun 29, 2000, you solicited comments to the Draft Environmental Impact Statement (DEIS) that analyzes potential environmental impacts of adopting specific interim criteria under which surplus water conditions may be declared in the Lower Colorado River Basin during an interim period that would extend through 2105. The comments of the Southern California Edison Company (Edison) to the DEIS are provided below.

Edison finds that the DEIS is flawed in at least three areas: determination of base line alternative conditions, lack of mitigation measures, and understatement of environmental impacts due to reduced capacity.

Determination of Baseline Alternative Conditions

1 | The no action alternative and baseline conditions do not represent the consensus of the entities linked to the Lower Colorado River. The baseline alternative represents a new condition that has not been reviewed by water and power users of the Lower Colorado River system. The proposed baseline conditions are not consistent with the conditions provided by the U.S. Bureau of Reclamation (Reclamation) in the annual rate process associated with the Boulder Canyon Project. The DEIS forecasts higher energy amounts than the amounts forecast by the annual rate process for the Boulder Canyon Project. The higher energy amounts in the DEIS imply a higher lake elevation than that implied in the Boulder Canyon Project rate process.

For example, the latest rate process for the Boulder Canyon Project shows energy generation to equal 4,501,001 MWh for the period 2004 through 2017 which is equivalent to a lake surface elevation of 1,159 feet. The DEIS shows the baseline energy amount to be 4,623 MWh during the year 2017 and a lake surface elevation of 1,170 feet. The amounts in the DEIS are greater than the amount used to develop firm power rates for the Boulder Canyon Project.

The baseline seems to be defined in a way which would preclude findings of significant impact. Under the described baseline condition, water levels at Lake Powell and Lake Mead would

1: The 70R strategy is used for the baseline in this FEIS. Reclamation has updated the surplus depletion schedules for California, Arizona and Nevada. This and other changed modeling assumptions could account for the increased energy amounts in this process. The updated schedules will be utilized in future annual rate processes. Reclamation believes the baseline used appropriately reflects future conditions.

steadily decline over the study period. The declaration of surplus water at these sites would further reduce water levels, but apparently not significantly. If the baseline were defined differently, the lowering of water levels associated with each alternative might be found to cause more significant environmental effects. It would seem more reasonable to describe the baseline as including relatively full reservoirs, with water releases and energy production at current and/or historic average levels.

Lack of Mitigation Measures

2 | Another weakness of the DEIS is the failure to identify any mitigation measures. It might be argued that the failure to find significant environmental impacts precludes the need to identify mitigation measures. However, if the comparison to a more reasonable baseline were made, the impacts might be found to be of greater significance, thus requiring mitigation.

Reclamation should consult with the water and power entities of the lower Colorado River system to identify the baseline conditions for all users of the lower Colorado River system.

Environmental Impacts of Reduced Capacity

3 | The DEIS trivializes the impact of replacing capacity and generation lost as a result of a lowering elevation of Lake Mead. The load following capability of Hoover is one of the best in the west. Hoover can change operating levels at a rate at least ten times faster than present fossil fueled generation plants. Each MW of reduction would have to be replaced by at least ten MW of conventional fossil generation. Carried to the extreme, Hoover is equivalent to about 20,000 MW of load following capability from fossil fueled generation. Since no large hydroelectric generation sites are planned for construction in the WSCC, the amount of lost load following capability will come from other resources including fossil fueled generation with attendant environmental consequences.

The DEIS should be expanded to assess the amount of capacity that would have to be replaced to supply load following capability and the environmental impact of the replacement capacity.

Thank you for giving Edison an opportunity to provide comments.

Sincerely,

Tamara L. Dayer

2: Comment noted. Although no impacts were identified that required mitigation, the FEIS includes a discussion of environmental commitments in Section 3.17. Note also that the baseline used in the FEIS (a 70R operating strategy) has been modified from that presented in the DEIS (a 75R operating strategy).

3: As discussed in Section 3.10.2.2 of the FEIS, Reclamation recognizes that the load-following capability of Hoover is important. The differences in the amount of capacity available for load-following between the baseline strategy and the alternatives is identified in the EIS.

SOUTHERN NEVADA
WATER AUTHORITY

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Southern Nevada Water System
243 Lakeshore Road
Boulder City, NV 89005
Telephone: (702) 564-7697
Fax: (702) 564-7222

September 6, 2000

Ms. Jayne Harkins
Attn: BCOO-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

SUBJECT: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE COLORADO RIVER INTERIM SURPLUS CRITERIA

In July 2000, the Bureau of Reclamation (Reclamation) issued a Draft Environmental Impact Statement (DEIS) on the Colorado River Interim Surplus Criteria. The Southern Nevada Water Authority (Authority) would like to take this opportunity to provide comments. The Authority represents the major water and wastewater purveyors in southern Nevada, including the Las Vegas Valley Water District, the Cities of Boulder City, Henderson, Las Vegas, and North Las Vegas, the Clark County Sanitation District, and the Big Bend Water District in Laughlin. These agencies serve over 1.3 million people in the southern Nevada region. The Authority and its members control over 90% of the State of Nevada's 300,000 acre-foot consumptive use from the Colorado River.

The Authority supports Reclamation's proposal to establish interim surplus criteria on the Lower Colorado River. The criteria are intended to provide direction during an interim 15-year period for the annual determination by the Secretary of the Interior of normal, surplus, and shortage conditions in the Lower Colorado River Basin. They will facilitate efforts by the State of California to reduce its use of Colorado River water down to its 4.4-million acre-foot basic apportionment. They will also afford other Lower Division states, who have contracted for surplus water, a greater degree of predictability about its annual availability.

1 cont'd below

Specifically, the Authority supports the proposal submitted by the seven Colorado River basin States (Seven Basin States proposal) for the interim surplus guidelines. In the past year, the seven basin states have spent substantial time and effort and have made significant progress in their negotiations on interim surplus, which have culminated in a set of interim surplus guidelines agreed to by each state. These guidelines were presented to Reclamation by the seven states, and Reclamation issued them to the public in a Federal Register notice on August 8, 2000.

1: The preferred alternative in this FEIS is derived from the Draft Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

Ms. Jayne Harkins
COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT . . .
September 6, 2000
Page 2

1 cont'd

The modeling approach used to perform the impact analysis and review of alternatives in the DEIS is legitimate, impartial, and best simulates the Colorado River system. Potential environmental impacts are minimal and interim in nature, and the Colorado River system would revert to baseline conditions after the expiration of the 15 year interim period.

Based upon our analysis, the Seven Basin States proposal is within the range of alternatives and impacts analyzed in the DEIS. Reclamation's National Environmental Policy Act guidance allows new or modified alternatives that do not have any significant differences in environmental impacts to alternatives analyzed in the DEIS to be fully incorporated into the Final EIS. The Seven Basin States proposal does not change the results relative to potential impacts in the DEIS. The Authority supports designation of the Seven Basin States proposal as the Preferred Alternative in the Final EIS and as the final decision in the Record of Decision.

The Authority acknowledges the leadership shown by the Department of Interior in implementing this process of developing interim surplus guidelines, and appreciates the opportunity to be involved in the process. If you have any questions about these comments, please contact David Donnelly, Deputy General Manager, at (702) 258-3107.

Sincerely,

Patricia Mulroy
General Manager

PM:JM:LL:sh

Uintah Water Conservancy District
78 West 3325 North
Vernal, Utah 84078
Phone 789-1651
Fax 789-1670

"Steinaker Dam" "Red Fleet Dam"

G 20

September 5, 2000

Ms. Jayne Harkins
Attention BCOO-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

To Whom It May Concern:

The following comments are made on the Proposed Colorado River Interim Surplus Criteria Draft Environmental Impact Statement.

The Uintah Water Conservancy District (UWCD) was organized according to the laws of the State of Utah. UWCD has direct control and management of Red Fleet Dam and Reservoir and Steinaker Dam and Reservoir, which are part of the Jensen and Vernal Units of the Central Utah Project. UWCD and its water users also have diversion rights to Green River water for more than 54,000 acre-feet annually. UWCD has more than 20 water providers (companies) that serve nearly 80,000 acres of irrigated lands and provide more than 26,000 acre-feet of culinary water. In addition, UWCD water users have increased their water use efficiency to the point of reducing salinity contributed to the Colorado River System by 92,000 tons annually. Consequently, UWCD has a compelling interest in all Colorado River operational matters, but especially those matters that might impact availability of water under current entitlements for beneficial consumptive use or present water right assignments.

Purpose and Need

For many years, California has been diverting more than its 4,400,000 acre-feet apportionment as defined in *Arizona v. California (1964)*. Prior to 1996, California drew on **unused** apportionments of other Lower Division States made available by the Secretary of the Interior. Since 1996, California has also drawn on **surplus** water made available by Secretarial determination. California is developing measures to reduce its draw on the Colorado River System through conservation, surface and underground storage, conversion of available agriculture water to M&I deficiencies, and other measures. Unfortunately, the full effect of these measures on California's draw on the Colorado River will not be seen for many years.

Colorado River surplus flow determinations have their origins in the *Criteria for Coordinated Long-Range Operations of Colorado River Reservoirs* (LROC) adopted in 1970. Article III

(3)(b) of the LROC set general conditions for surplus determinations. Occasionally, the Secretary has determined that surplus conditions exist, based primarily upon avoiding mandatory flood control releases. This narrow interpretation of surplus is heavily biased toward **supply**. Other discussions were heavily biased toward **need**. These discussions have led to much controversy among the Basin States and suggest that more discrete surplus criteria should attempt to balance both need and supply considerations. Meanwhile, the need for surplus determinations by California has risen sharply because of the dramatic reduction of unused apportioned water in Arizona and Nevada.

1

Upper Basin Depletion

While California is drawing far more water from the Colorado River than allocated (often as much as 800,000 acre-feet more than allocated) and Arizona and Nevada are using nearly their full allocation, the Upper Basin States have not developed their share of Colorado River water at the same pace. They have chosen a more conservative and judicial approach to Colorado River water development. *The Colorado River Compact of 1922* allocated 7,500,000 acre-feet annually to the Upper Basin States in **perpetuity**. This means there is no schedule or time horizon to cause this allocation to expire. The Compact **guarantees** the delivery of the Lower Basin's allocation, so if there is a shortage, the shortage burden is on Upper Basin. The latest "Hydrologic Determination" indicates that only 6,000,000 acre-feet are available for Upper Basin development. So, for all practical purposes, the Upper Basin States have already lost 1,500,000 acre-feet from their "permanent" allocation.

2

UWCD believes the implementation of Interim Surplus Criteria as proposed by the Seven Basin States will not jeopardize the further development of Upper Basin entitlements. Also, the proposed criteria will not limit the water available for existing uses during the 15-year interim period.

Conclusion

3

UWCD applauds the efforts of the Seven Basin States to reach agreement on guidelines for implementing Interim Surplus Criteria. This represents a "Herculean" effort by a highly diverse group of Colorado River stakeholders. It is unprecedented in scope and should cement the Record of Decision by the Secretary. UWCD encourages Reclamation and Interior to conclude the NEPA compliance process as scheduled and without interruption or delay.

4

The existing problems with fish and wildlife habitat in the Colorado River Delta and the Salton Sea will not be aggravated by this action.

5

If Colorado River water is to be used to solve these problems, it must come from existing entitlements. This agreement is a reasonable approach to make the transition suggested by California. The agreement provides protection to the States and treats Lake Powell and Lake Mead equally. It also provides some enforceability because of the provisions that 70R of the existing Annual Operating Plan are implemented if the agreement is not adhered to.

6

UWCD further believes that the consequence of no action on this issue would be protracted and costly legal challenges. Any legal action will likely transfer the decision process from water resource experts to the unpredictable legal arena that may further jeopardize Upper Basin entitlements. In light of the public comment meeting held in Salt Lake City, Utah on August 23,

1: Comment noted.

2: Comment noted.

3: Comment noted.

4: Comment noted.

5: Comment noted.

6: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

cont'd 2000 and the absence of any opposition whatsoever, UWCD strongly encourages the implementation of the Seven Basin States guidelines for Interim Surplus Criteria.

7 UWCD acknowledges that other Colorado River issues that remain unresolved. Water in satisfaction of the Mexican Treaty remains a federal obligation and the minimum objective release requirements from Glen Canyon Dam are contrary to Upper Basin interests and to UWCD interests, as well. However, these issues do not detract UWCD from unqualified support of this action.

8 Finally, UWCD recommends that Reclamation proceed with the development of the Annual Operating Plan (AOP) for Colorado River Reservoirs for 2001 without delay and without the Record of Decision on the Interim Surplus Criteria. The Seven Basin State agreement should be regarded as the basis for surplus determination for the year 2001. There are no other highly charged issues that are influenced by the AOP.

Sincerely,

Scott Ruppe
General Manager

CC:
Larry Anderson, Utah Division of Water Resources

Cloyd Harrison, Uintah County Commission

Randy Crozier, General Manager, Duchesne Co. Water Conservancy District

7: Comment noted. Reclamation recognizes that the Upper Basin disagrees with the minimum objective release currently in the LROC.

8: The determination of surplus conditions for 2001 is based on the factors listed in Article III(3)(b) of the LROC. This Article allows for consideration of all relevant factors, including, but not limited to, those specifically listed in the Operating Criteria, whether or not a decision is made for the proposed interim suplus criteria.

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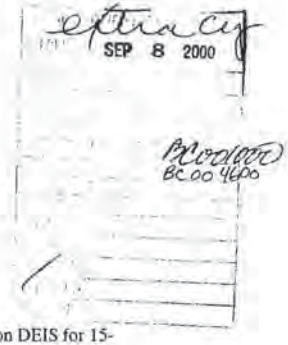
September 7, 2000



VIA FAX AND OVERNIGHT MAIL

Ms. Jayne Harkins
Lower Colorado Regional Office
Bureau of Reclamation
Attention BCOO-4600
P.O. Box 61470
Boulder City, Nevada 89006

United States Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, Nevada 89006

Re: Colorado River Interim Surplus Criteria-Comments on DEIS for 15-year Agreement Governing Lower Basin Water Allocations-Reference DES 00-25

Ladies and Gentlemen:

Enclosed please find the comments of the Union Park Water Authority to the draft EIS ("DEIS") concerning the 15 year agreement for the proposed Colorado River Interim Surplus Criteria affecting the Lower Basin ("15-year agreement"). The Union Park Water Authority and its attorneys did not receive a copy of the DEIS until September 6, 2000, though one was requested much earlier. The short time frame allowed for comment on this important document and the underlying decision is utterly inadequate to the importance of the topic to the Lower Basin and to the State of Colorado. The Union Park Water Authority requests an additional sixty (60) days beyond September 8, 2000, to make additional comments.

The Union Park Water Authority is composed of the following members, all of which have actual or projected water service responsibilities in the area of southern and southeastern metropolitan Denver and environs: Arapahoe County, Parker Water and Sanitation District, Rangeview Metropolitan District and Arapahoe County Water and Wastewater Authority. The Denver metropolitan area and surrounding communities lie to the east of the Rocky Mountains, but, for Colorado River Compact purposes, are considered a part of the Colorado River basin when Colorado River water is used east of the continental divide. The UPWA is attempting to develop the Union Park Reservoir Project ("Union Park Project"), designed to store surplus flows from the Upper Gunnison River for delivery to both the east and west slopes of Colorado. The Union Park Project is a high altitude, off-river storage project. The Gunnison is a major tributary of the Colorado River, and the basin of the Gunnison River lies entirely within Colorado.

The Union Park Project lies approximately 35 miles above the Aspinall Unit, a series of three federal reservoirs constructed under the authority of the Colorado River Storage Project Act ("CRSPA"). The largest of these is Blue Mesa Reservoir with a storage capacity of roughly a million acre-feet. The UPWA and its predecessor, Arapahoe County, have been in litigation for 12 years to attempt to obtain water rights to store water at the proposed Union Park Reservoir for municipal uses. UPWA believes that an annual average of 110,000 to 120,000 acre feet may be diverted in each year for use on both slopes. In that litigation, the U.S. Bureau of Reclamation, has now asserted the ability to utilize power generation, recreational and flood control rights at the Aspinall Unit to block new municipal appropriations in Colorado. The United States has not yet made similar assertions related to the other CRSPA units, being the Glen Canyon, Flaming Gorge or Navajo facilities, but plainly could. Since Colorado has the largest entitlement to the Upper Basin's Compact share, the inability of Colorado to develop has a major impact on the Upper Basin's ability to develop.

Comment Summary

The 15-year agreement, viewed in concert with related agreements concerning usage in California, affords major, new protections to municipal and industrial use in the Lower Basin, and California in particular. The needs of the Lower Basin cannot be viewed in isolation; without a concurrent commitment to protect municipal requirements in the Upper Basin, including Colorado, there is no protection for the Upper Basin. The DEIS fails to consider either the significance or the practical effect of vigorous, current federal efforts to prevent development of Upper Basin's Compact share for municipal use. The UPWA is deeply concerned that the 15-year agreement will be utilized to support the continuing efforts by the federal government to prevent additional usage of Colorado's Compact share on the Colorado front range. Without a concurrent commitment to develop water resources in the Upper Basin for actual use, the usage of surpluses generated in the Upper Basin will be permanently targeted for use in the Lower Basin for municipal and industrial use and for the protection of endangered species there and in Mexico. 1

The DEIS fails to discuss the federal government's assertion that its ownership of CRSPA facilities in the Upper Basin allows it to prevent the upstream development of Colorado's Compact share for municipal use. The protection of municipal and industrial uses in the Lower Basin, while actively attempting to prevent municipal use in the Upper Basin, is a threat to the long-term interests of the Upper Basin states. The interests and needs of both basins must be considered concurrently.

The DEIS's sensitivity analysis indicates that the threat to Lake Powell storage levels may be very great during periods of prolonged drought. The analysis contained in the DEIS appears to be founded on average flow conditions. A threat to Lake Powell storage levels is a threat to the Upper Basin states, including Colorado, and needs to be taken far more seriously. 2

The DEIS also fails to take into account the importance of groundwater banking of artificial surplus waters in the Lower Basin on Lake Powell storage levels. First, there is a question as to whether 3

1: The DEIS recognized that future water development will be taking place in the Upper Basin. The computer model simulations of the Colorado River used in the DEIS incorporate an Upper Division depletion schedule, developed by the Upper Colorado River Commission in 1996 in coordination with the Upper Basin States. This Upper Basin depletion schedule, as contained in Appendix K, shows Upper Basin water development taking place in the future with Upper Basin depletions increasing with time. For the FEIS a revised depletion schedule, developed in 1999, was incorporated into the Colorado River computer model. While the analysis performed for the FEIS uses increasing depletion estimates for the Upper Division, the development of specific new water projects within the Upper Division and the environmental compliance and the legal issues to be resolved in such specific projects are not part of the scope of this proposed action.

2: The analysis does show that Lake Powell storage is sensitive to periods of drought under all alternatives considered in the EIS. Changes in Lake Powell storage resulting from surplus water deliveries to the Lower Basin is an important impact being analyzed in this EIS.

3: The Colorado River Basin Project Act of 1968 (CRBPA), in Section 602 (a)(3), states that water not required to be stored under Sections 602 (a)(1) and 602 (a)(2) of the CRBPA shall be released from Lake Powell under specified conditions, and one of those conditions is if it can be reasonably applied in Lower Division States to the uses specified in Article III (e) of the Compact. Article III (e) of the Compact specifies water must be applied to domestic and agricultural uses. The CRBPA further specifies that water is not to be released from Lake Powell when the active storage in Lake Powell is less than the active storage in Lake Mead. As long as the conditions set forth in the CRBPA and the LROC for Colorado River reservoirs are satisfied, we believe the release of surplus water for groundwater banking is fully in compliance with applicable law. Finally, the Lower Division states each define groundwater banking to be a beneficial use.

cont'd

groundwater banking is a current, beneficial use of Compact water under §602. This question is separate and distinct from how wise banking might be from an engineering standpoint. This is a highly relevant inquiry, in that the delivery of artificial "surplus" waters for groundwater banking will require lowering Lake Powell to make equalizing deliveries to Lake Mead. The draft agreement should be modified to prevent lowering of Lake Powell storage levels to make deliveries to the Lower Basin for other than current, beneficial uses, and should specify that releases should not be made for groundwater banking in the Lower Basin.

4

The 15-year agreement appears to contain the potential for substantial damage to be done to Upper Basin interests absent firm requirements for limiting or de-linking equalizing releases from Lake Powell to Lake Mead. The strategy of lowering Lake Powell to make delivery of artificial surpluses to the Lower Basin is, in UPWA's view, highly risky.

Colorado and the Rest of the Upper Basin Will Only Be Protected by Development of Their High-Altitude Storage Capacity--The 15-Year Agreement Contains no Assurances of Colorado's Right to Develop its Remaining Compact Share

5

The 15-year agreement offers significant assurance to the Lower Basin population centers that municipal and industrial water will be available for delivery during the 15-year agreement period at some substantial risk to Lower Basin agriculture. At the same time, however, the United States and environmental groups are acting to prevent new municipal appropriations in the Upper Basin, principally in Colorado. We do not believe that these developments can be ignored by the DEIS, or that they are unrelated.

The 15-year agreement does offer Colorado and the Upper Basin some degree of certainty with regard to water allocation in the Lower Basin. The principal assurance to the Upper Basin is establishing firm benchmarks as to when the Secretary will act to declare surplus or shortage conditions in the system. Clearly, the agreement favors the certainty of municipal supplies in the Lower Basin when viewed in light of the active construction of additional storage there and the re-allocation of Lower Basin priorities.

The situation in the Upper Basin inspires less confidence. When, at the same time as municipal supplies in the Lower Basin are being protected, the U.S. Bureau of Reclamation is acting to prevent municipal development of Upper Gunnison waters in the Colorado portion of the Upper Basin, there is little cause for the Upper Basin states to believe that they are truly protected. In essence, the silence of the Upper Basin gives Lower Basin interests a virtual green light to assure the survival of the surpluses past the 15-year point by utilizing vigorous and active efforts to prevent Upper Basin development.

Without a comprehensive commitment to act to develop Upper Basin resources, the 15-year agreement is but half a loaf. The agreement fails to take account of any need to act to develop Upper Basin water resources to meet critical needs there. The DEIS fails to evaluate the impact of

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4: As noted in Section 1.4.2, the equalization requirement in the LROC is the mechanism through which delivery of surplus water to the Lower Basin can influence the operation of Glen Canyon Dam resulting in changes to the storage of water in Lake Powell. Changes in Lake Powell storage resulting from surplus water deliveries to the Lower Basin is an important impact being analyzed in this EIS.

5: The DEIS recognized that future water development will be taking place in the Upper Basin. The computer model simulations of the Colorado River used in the DEIS incorporate an Upper Basin depletion schedule, developed by the Upper Colorado River Commission in 1996 in coordination with the Upper Basin states. That Upper Division depletion schedule, shows Upper Basin water development taking place in the future with Upper Basin depletions increasing with time. For the FEIS, a revised depletion schedule, developed in 1999, was being incorporated into the Colorado River computer model. While the analysis performed for the FEIS uses increasing depletion estimates for the Upper Division, the development of specific new water projects within the Upper Division and the environmental compliance and the legal issues to be resolved in such specific projects are not part of the scope of this proposed action.

September 7, 2000
Page 4

6 Upper Basin development on the needs and water availability in the Lower Basin, including the extent to which development of high storage capacity in the Upper Basin might lead to less frequent surplus conditions in the Lower Basin. The situation in the Upper Basin is not neutral. The U.S. BUREC and the U.S. Fish and Wildlife Service are asserting legal positions which are making it more difficult to appropriate water under the Upper Basin States' Compact shares. This is not a theoretical concern, but one which exists today, and which can only worsen if continued for 15 more years.

The 15-Year Agreement is Not Without Risk to the Upper Basin

7 Though the primary risks inherent in the 15-year agreement will fall within the Lower Basin, the agreement is not without risk to the Upper Basin. It is apparent from the notice that the Metropolitan Water District of Southern California ("MWD") is a major beneficiary of the agreement. It is clear that MWD has major new assurances that it will be able to deliver a firm supplies of water for municipal and industrial ("M & I") use during the 15 year period. The risks seem to fall mainly on agricultural use in the Lower Basin, and upon storage levels in Lake Mead. It seems clear that a series of drought condition years would cause a major run-down of Lake Mead storage levels.

8 The likelihood of a major rundown in Lake Mead storage should be further evaluated under historic drought conditions, as well as under anticipated "average flow" conditions. To the extent that this was done in the Sensitivity Analysis of Shortage Assumptions, major decreases below storage protection targets occur at Lake Powell. In the Final EIS, 3 lines should be included in the Lake Powell End of Year Elevations to show the collapse of storage levels below the pool level targeted for protection by the 15-year agreement. The results of the sensitivity analysis are startling, and are deserving of far greater attention in the DEIS.

16 Should a storage rundown occur, and should major shortages develop in the Lower Basin, the Upper Basin is theoretically protected by a required de-linking of equalizing flows from Lake Powell, behind Glen Canyon dam, to Lake Mead under §602 (a). It is virtually certain that strong political pressure would be brought to bear to release Compact storage from Lake Powell to relieve shortage conditions at Lake Mead and in the Lower Basin generally. The 15-year agreement does not appear to contain assurances that the Secretary would not act to meet shortage conditions by releasing waters from Lake Powell, other than to mandate a minimum storage value at Lake Powell of 14.85 maf and a minimum storage target of elevation 3630.

9 There appears to be a danger that the flow assumptions which underlie the 15-Year Agreement are too optimistic, and that greater attention needs to be paid to the effect on storage levels of prolonged low flow, or drought, conditions. Indeed, modeling of other parameters indicates that the actual fluctuations may be far greater than those depicted on the end of year elevations.

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6: Comment noted.

7: See response to Comment 5-2 with regard to effects of interim surplus criteria on the Upper Basin. The FEIS addresses the risk of severe drawdown of Lake Mead.
8: The method used to model the future inflows into the Colorado River in the FEIS is referred to as the Index Sequential Method (ISM). This technique has been used since the early 1980s and involves a series of simulations, each applying a different future inflow scenario. Each future inflow scenario is generated from the historical natural flow record by "cycling" through that record. As the method progresses, the historical record is assumed to "wrap around," yielding a possible 85 different inflow scenarios. The result of the ISM is a set of 85 separate simulations (referred to as "traces") for each operating criterion that is analyzed. The ISM captures the range of historical inflows that include drought periods, wet periods and in-between periods. This method enables an evaluation of the respective criteria over a broad range of possible future hydrologic conditions using standard statistical techniques.

15: The Lake Powell water surface elevation of 3630 feet is not an elevation identified as a specific threshold water surface elevation. As such, this specific elevation was not analyzed. Other Lake Powell water surface elevations were analyzed that ranged from 3695 to 3612 feet. These range of elevations that were analyzed include all the elevations identified as specific threshold Lake Powell water surface elevations.

16: With interim surplus criteria in effect, the Colorado River would still be operated according to existing regulations. Please see response to Comment No. 5-2.

9: Elevations of lakes Powell and Mead may fluctuate more than 10 feet within any given year. These fluctuations are represented by end-of-December analyses for Lake Mead and end-of-July water level analyses for Lake Powell. However, the Index Sequential Method of modeling which was performed using monthly time steps (see response to Comment 61-8), and presentation of 10-percent, 50-percent and 90-percent exceedence levels (see Section 2.3.4) indicate reasonable responses of reservoir levels to a wide range of hydrologic conditions.

The Needs of the Lower Basin for Certainty Cannot be Divorced from Identical Needs in the Upper Basin

10 The Lower Basin cannot be viewed in isolation from the Upper Basin. The Secretary has now taken the position that BUREC may operate CRSPA facilities to prevent Upper Basin development, at least development not politically favored by the Secretary. This position is dangerous to the position of the Upper Basin, despite any assurances that Colorado's negotiating team may have given to the other Upper Basin States. If BUREC can utilize CRSPA to prevent, rather than to aid, Upper Basin development, why should the Upper Basin believe that Lake Powell storage levels will remain inviolate, if indeed they will at all? Could a 14.85 maf storage level at Lake Mead trigger Compact delivery requirements at the other, smaller CRSPA reservoirs above Lake Powell?

Given BUREC's recent attempts to prevent Upper Basin development in Colorado, representing the majority of the Upper Basin's Compact Share, the opportunity afforded the Upper Basin to sue the Secretary to protect Lake Powell storage levels may not be a viable remedy.

Inadequate Attention is Paid to the Delivery of "Surplus" Waters For Groundwater Banking in the Lower Basin

Groundwater banking in the Lower Basin of genuine flood surplus flows is unobjectionable and generally wise. The situation is different where the delivery of artificial surpluses, which require lowering Lake Mead storage levels, is made for groundwater banking.

11 To protect the Upper Basin, it is imperative that equalizing releases from Lake Powell not be made to Lake Made to replace water delivered for groundwater banking. The 15-year agreement, and the DEIS, fail to account for the potential impact on the Upper Basin from groundwater banking in the Lower Basin.

The UPWA questions whether groundwater banking of other than flood surplus flows is a current, beneficial use in the Lower Basin for which deliveries of other than flood surplus flows are authorized for Compact purposes.

The Protection Offered to the Upper Basin is Illusory Given Related Actions by the United States

12 The UPWA thus brings a unique perspective to its comments. Though the 15-year agreement is ostensibly designed, in part, to offer assurance to the Upper Basin states, including Colorado, that its right to develop Upper Basin allocations will be protected, such protection appears to be illusory, at best. The United States is already moving aggressively to prevent Upper Basin development predicated upon its control of federally owned facilities, including CRSPA facilities.

10: The statement that the "Lower Basin cannot be viewed in isolation from the Upper Basin", is a true and valid statement. In the analysis, both the Upper and Lower basins were considered. Future increased water development in the Upper Basin is incorporated into the analysis. Computer model simulations of the Colorado River used in the DEIS incorporate the 1996 Upper Basin depletion schedule, developed by the Upper Colorado River Commission in coordination with the Upper Basin States. For the FEIS, an updated depletion schedule, developed in 1999, was used. The computer modeling performed for all alternatives showed no instances where water stored in reservoirs above Lake Powell was required to be released to satisfy the requirements of the Colorado River Compact.

11: During the interim surplus criteria period, the agencies that have contracted for surplus water will use surplus water, when available, to meet direct water supply demands, as well as to provide a source of water for conjunctive use and storage programs. The delivery of water to Colorado River water users will be in accordance with the guidelines developed for the selected surplus alternative, if one is selected, and will be consistent with the Law of the River. The FEIS considered and evaluated the potential impact to the Upper Basin users resulting from the surplus alternatives. The analysis results indicated that the interim surplus criteria would have no significant effect on the Upper Basin users as a result of the interim surplus criteria.

12: Reclamation is required to take certain actions to administer United States obligations under the Endangered Species Act and we acknowledge that some actions to meet species protection mandates may affect river operations. Reclamation's required actions to protect and enhance habitat for threatened and endangered species in the United States should not be interpreted as opposition to Upper Basin development. The United States does not assume an obligation to mitigate for adverse impacts in Mexico, but supports joint cooperation projects that would benefit both the United States and Mexico. We acknowledge that in the long run, Upper Basin development will reduce the amount of surplus water available for delivery in the Lower Basin.

cont'd

Recent activities and litigation in the Lower Basin and in the Rio Grande raise concurrent concerns about future use of the Endangered Species Act to bypass statutory and Compact requirements in the name of species protection. The United States and numerous environmental groups are moving aggressively to utilize the Endangered Species Act to prevent additional water development in the Upper Basin and elsewhere, and to concurrently re-orient the use of federal water facilities and water operations to protect endangered species. The DEIS fails to analyze the likely impact of these activities and litigation upon the future operation of facilities in the Upper Basin and the Lower Basin. For example, in the Rio Grande drainage, the United States is asserting that its ownership of facilities allows it to mandate releases and bypasses to meet species protection goals under the ESA. A recent lawsuit by environmental groups in the United States and Mexico to protect endangered species in both countries has raised an issue regarding the ability of the Secretary to honor statutory or Compact commitments in the long term when faced with legal challenges to current patterns of operation. These activities do not occur in a vacuum when considering the fate of Upper Basin development, and raise immediate concerns about federal opposition to further Upper Basin development. The 15-year agreement contains no federal commitments protecting the Upper Basin.

The operational effects of Federal environmental initiatives, including the ESA, upon CRSPA facilities, critical to meeting Lower Basin needs during the 15-year agreement, must be evaluated. The U.S. is currently involved in litigation as both a plaintiff and a defendant, and the outcome of current ESA litigation on the 15-year agreement, and the Upper Basin, needs to be evaluated. Once again, these concerns are not theoretical, or in the future, but real, and present now. In Colorado, significant releases from Blue Mesa Reservoir are already contractually dedicated to endangered species protection. What is the cumulative impact of all these policies and actions on the Upper Basin and its human populations? The DEIS offers no such analysis.

13

The DEIS further notes that lowering Lake Mead storage levels may create additional habitat for endangered species at several locations. There is no discussion of the arguments that could be made for such a situation becoming either permanent, or the object of additional protection. What effect would the creation of additional habitat at Lake Mead have upon equalizing flows from Lake Powell?

The 15-year Agreement and the DEIS ignore the Need to Develop the Upper Basin as the Necessary Complement to Fair Implementation

14

The 15-year agreement has the effect of looking at major developments in the Lower Basin in isolation. Though the 15-year agreement may help to support the Upper Basin's already strong legal claim to develop its remaining Compact share, the practical effect is far more limited. The reasons for those limitations are discussed above.

The Upper Basin has no reason to be sanguine about its future prospects without concurrent action to develop its own rights. The United States and environmental groups are actively working now to put in place legal requirements to make significant Upper Basin development difficult or impossible. Thus, re-orientation of Lower Basin allocations should not be considered in isolation

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13: Additional riparian habitat could develop at various locations around Lake Mead when lower surface elevations occur. As discussed in Section 3.8, lower elevations could occur under baseline conditions and each of the alternatives depending primarily upon future hydrologic conditions and Lake Mead water releases. The EIS recognizes that fluctuating reservoir elevations would continue under baseline conditions and the alternatives, which would likely result in future periods of both inundation and exposure of these areas. The proposed action would not change 602(a) equalization requirements.

14: Reclamation and other federal agencies have complex missions and sometimes conflicts arise on issues. For example, Reclamation's legal responsibility to administer the Endangered Species Act affects river operations and the timing of water deliveries. Reclamation does not oppose Upper Basin development but must fulfill its legal obligations under ESA, NEPA and other applicable federal legislation. We acknowledge that the construction and operation of water development projects has become more complicated with additional laws and environmental considerations, but such considerations cannot be ignored.

cont'd

from the crying need for Upper Basin development to avoid major shortages. These areas of shortage will include the Colorado Front Range communities, which are not protected by the agreement.

Put simply, the protection of municipal uses in the Lower Basin while municipal uses are actively prevented in the Upper Basin raises numerous issues which have not been answered by the DEIS. Such actions is the Upper Basin are directly related to the likely permanence of the use of Colorado generated surpluses in the Lower Basin, and in California particularly.

Conclusion

Though the 15-year agreement has some merit, it, like the Colorado River Compact itself, cannot be considered in isolation. The only real protection which the Upper Basin has will come with the development of its own potential, including the ability of Colorado to protect its own citizens from the effects of diminished supply and drought. In the meantime, the DEIS fails to account for federal aggressiveness in attempting to foreclose the very development which, in theory, the 15-year agreement attempts to protect. This is a matter critical to Colorado's water future, including the large urban populations of the Colorado front range. This human environment is plainly a major part of the NEPA equation, and must be addressed.

The DEIS fails to consider the threat to Lake Powell storage levels under drought conditions. The DEIS fails to consider the threat to Lake Powell storage levels from groundwater banking in the Lower Basin of other than flood surplus flows. The 15-year agreement and the DEIS fail to deal with the use of Lake Powell to equalize the delivery of artificial surpluses to the Lower Basin, and to the MWD in particular. Any threat to Lake Powell storage is a threat to the long term future of the Upper Basin. This is an issue of the first importance, but is not addressed.

Thank you for the opportunity to comment. Once again, we would like to renew our request for additional time to develop comments on the DEIS.

Sincerely,

VRANESH AND RAISCH, LLP

John R. Henderson

JRH:kes
cc: Union Park Water Authority

UPPER COLORADO
RIVER COMMISSION
355 South 400 East • Salt Lake City • Utah 84111 • 801-531-1150 • FAX 801-531-9705

September 8, 2000

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BCOO/600
4600

BY FAX AND U. S. MAIL

Regional Director
Lower Colorado Region
U. S. Bureau of Reclamation
P. O. Box 61470
Boulder City, Nevada 89006-1470

Attention: Ms. Jayne Harkins – BCOO-4600

Dear Ms. Harkins:

On behalf of the Upper Division States, thank you for the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS) and supplemental information on the "Colorado River Interim Surplus Criteria."

The Upper Colorado River Commission is an interstate administrative agency created by the Upper Colorado River Compact of 1948. The member States of the Upper Colorado River Commission are: Colorado, New Mexico, Utah and Wyoming. Since its inception, the Commission has actively participated in the development, utilization and conservation of water resources of the Colorado River Basin.

The Upper Colorado River Commission has been concerned for a long time about the Lower Colorado River Basin's demand for water in excess of its Compact apportionment. This has been especially true in California.

As early as 1990, discussions between California and the other Basin States were initiated in an attempt to encourage California to manage its demand for Colorado River water to remain within its basic Colorado River apportionment. Beginning in 1996, Lower Basin demands above 7.5 million acre-feet (maf) per year have been met because of favorable hydrologic conditions and through the use of a surplus determination as contemplated in Article II(B)(2) of *Arizona v. California*. Favorable hydrologic conditions may not, however, provide adequate water supplies to meet similar future Lower Basin demands.

California has recently completed the negotiation of a water management plan that could facilitate water conservation and transfer sufficient to allow California's needs to be met within its basic apportionment of 4.4 maf by 2016. Certain of the interim surplus criteria alternatives analyzed within your Draft Environmental Impact Statement could provide short-term certainty to domestic users in California and the other Lower Basin States while providing sufficient time for California to implement its necessary water savings and transfer activities.

Ms. Jayne Harkins
September 8, 2000
Page 2

The supplemental seven Basin States information provided by *Federal Register* notice dated August 8, 2000 is a carefully crafted set of interim guidelines that represent a consensus agreement among the seven States to govern the determination of surplus conditions in the Lower Colorado River for the next 15 years. These guidelines have been specifically developed to firm up domestic supplies in the Lower Basin while providing appropriate protection for all water users in the Colorado River Basin during the interim period. Further, the proposed guidelines are predicated on and contain enforceable measures to insure that California implements the necessary measures to manage its future demand on Colorado River mainstem water to 4.4 maf/year.

1 These seven Basin States-proposed guidelines fit within the range of the alternatives evaluated in the present DEIS. It is our full expectation that they will be adopted by the Secretary of the Interior as the preferred alternative in the Final Environmental Impact Statement (FEIS) and Record of Decision.

For further consideration in your development of the Final Environmental Impact Statement, we provide the following comments of specific concern:

2 (1) The Upper Colorado River Commission, in its review of the DEIS, finds that there are a number of views expressed in the DEIS concerning the "Law of the River" with which it disagrees or does not wholly concur. However, these differences do not significantly impact the results of the DEIS and thus the Commission does not see any merit in debating them in the DEIS process. However, the Commission wants it clearly understood by all parties that it is not, in any way, changing long-standing positions on Colorado River issues by reason of the way they may be stated in the DEIS. Rather, we would strongly encourage the Bureau of Reclamation to include the usual disclaimer it uses to address the differences that exist with respect to the "Law of the River."

3 (2) In December 1999, the Upper Colorado River Commission approved and made available revised Upper Basin depletions for use in long-range model studies. These revised depletions were provided to Reclamation in January 2000. These revised demands were used when the seven Basin States utilized CRSSE2 in analyzing the impacts of and arriving at the seven Basin States' interim surplus guidelines discussed above. Model studies for the Draft Environmental Impact Statement utilizing Riverware did not use these revised Upper Basin States depletion estimates. We request that the revised Upper Basin depletions be incorporated in any future modeling efforts to support your Final Environmental Impact Statement (FEIS).

4 cont'd below (3) The no action/baseline strategy, described as a 75R strategy, is not a strategy based on an accurate depiction of past actions. Surplus determinations have been made since 1996. The determination for 1996 was made retroactive, based on a 70R strategy and when demands were projected to exceed 7.5 maf. During the development of the 1997 Annual Operating Plan (April through June), hydrologic and forecast criteria substantiated a 70R strategy surplus determination. Only after completion of the "Field Draft" did water supply conditions change, jeopardizing a surplus determination justified by a 70R strategy. A conscious decision was made by Basin States representatives and Interior to stick by a surplus strategy supported by

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

2: Comment noted.

3: Revised depletion schedules provided by the Basin States were used in analyses for the FEIS. See response to Comment No. 14-10 for more detail.

4: The 70R strategy has been used for the baseline in this FEIS. For additional information, see response to Comment 57-11.

4 cont'd a 70R strategy surplus based on conditions prevalent during the time frame of Interior/Basin States negotiations. Surplus determinations since 1997 have all been made under flood control or 70R trace conditions. To suggest that a 75R strategy represents the no action (historical process) is not historically correct.

5 (4) The Draft Environmental Impact Statement characterizes the six Basin States plan as based on 75R trace hydrology. This is categorically incorrect. The six Basin States' guidelines (December 1998) as well as the present seven Basin States interim guidelines all have as a baseline condition a return to 70R trace criteria following the interim period.

6 (5) Your comparisons of alternative studies are not consistent in their assumptions. The Base Case and Flood Control alternatives were evaluated not including the water conservation and transfer contemplated in the California 4.4 plan. However, when similar studies were made for the six Basin States and California plan, these conservation and transfer measures were included, rendering the comparative results somewhat in error. All final comparative alternative studies must have similar assumptions, and we recommend that the provisions of the California 4.4 plan be a part of each analysis.

7 (6) All of the present alternative studies in the Draft Environmental Statement have been made without consideration of periodic inflows into the Colorado River from the Gila River above Yuma, Arizona. These periodic flows provide a significant impact on releases from Lake Mead for deliveries to Mexico and as such influence system demands and storage in both the Lower Basin and the Upper Basin. We believe these Gila River flows need to be identified, and we encourage Reclamation to do so.

The timely adoption of interim surplus criteria is of the utmost importance in being able to provide dependable domestic water supplies in the Lower Basin in the near term. We encourage you to complete the Final Environmental Impact Statement (FEIS) and Record of Decision prior to January 1, 2001.

Very truly yours,

Wayne E. Cook

Wayne E. Cook
Executive Director

5: The operational modeling for the Six States Alternative uses the 70R strategy after the 15-year interim period in this FEIS.

6: Please see response to Comment 37-11.

7: All studies have been made without consideration of periodic inflows into the Colorado River from the Gila River above Yuma, AZ. Gila River flows are infrequent and unpredictable. The RiverWare CRSS model is not currently set up to model Gila River flows; there was insufficient time to incorporate them into the model. The US Army Corps of Engineers has recently completed flow studies of the Gila River. Reclamation is reviewing this new data and will consider modeling the Gila River in future studies.

LOCAL AGENCIES

City of Phoenix

11

September 8, 2000

Mr. Robert Johnson
Regional Director
Lower Colorado Regional Office
c/o Jayne Harkins
BC00-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

Re: Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

Dear Mr. Johnson:

On behalf of the City of Phoenix ("City of Phoenix") I hereby offer comments to the Bureau of Reclamation's ("Reclamation") Colorado River Interim Surplus Criteria Draft Environmental Impact Statement ("DEIS").

Colorado River Basin States Proposal

1 As outlined in the Federal Register Vol. 65, No. 153, dated August 8, 2000 the states of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming have agreed to Interim Surplus Criteria ("Seven Basin States Plan") and have consulted with the Secretary of the Interior ("Secretary") as contemplated by the statutory framework for the operation of Colorado River Reservoirs.

Phoenix supports Reclamation's preliminary determination that the Seven Basin States Plan is within the range of alternatives and impacts analyzed in the DEIS (65 Fed.Red. 48531, August 8, 2000). Phoenix requests that the FEIS recognizes that the Seven Basin States proposal has been adequately analyzed. Phoenix supports the adoption of this alternative as the preferred alternative for the proposed action .

Baseline Condition

2 cont'd below Phoenix believes that the 70R spill avoidance strategy more accurately reflects historical practices by the Secretary in managing the Colorado River Reservoir System. The 70R strategy should therefore be adopted as the baseline condition.

1: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

2: The 70R strategy is used for the baseline in this FEIS. For additional information, see response to Comment 57-11.

Mr. Robert Johnson
Regional Director
Lower Colorado Regional Office
September 8, 2000
Page 2

2 cont'd

The 70R strategy has been adequately analyzed in the DEIS because "modeling results from 70R strategy are very similar to the Flood Control Alternative, which is evaluated in the DEIS (described in Section 2.3.2). DEIS at 2-1. Adoption of the 70R strategy as the baseline in the FEIS will not require any major reworking of the data found in the DEIS.

3

California Colorado River Water Use Plan (4.4 Plan)

The DEIS states that the Secretary "may condition the continuation of interim surplus criteria for the entire period through 2015 on a showing of satisfactory progress in implementing the 4.4 Plan." DEIS at 1-22.

Phoenix urges the Secretary to explicitly recognize that the continued effectiveness of the Interim Surplus Criteria proposed in the Seven Basin States Plan is to be conditioned on continued progress by California towards implementation of its 4.4 Plan.

4

Transboundary Impacts

Section 3.16 of the DEIS contains a lengthy discussion of the "potential effects that extend across the international border below the NIB." DEIS at 3.16-1.

Phoenix does not believe that Reclamation's analysis of these potential impacts is warranted. Reclamation recognizes the tenuous nature of its analysis since the DEIS states that "the potential effects on Mexico's resources cannot be specifically determined due to the uncertainty of water use once it flows across the NIB into Mexico. The waters of the Colorado River, once delivered to Mexico, as agreed upon in the Mexican Water Treaty of 1944, are the exclusive property of Mexico. The treaty contains no provisions requiring Mexico to provide water for environmental protection, nor any requirements relating to Mexico's use of that water." DEIS at 3.16-1.

3: The selection of the Basin States Alternative as the preferred alternative incorporates the implementation of California's Colorado River Water Use Plan conservation progress. Proposed guidelines for this alternative are in Attachment I.

4: Comment noted. (See response to Comment 22-4.) In addition, CEQ guidance recognizes that there are concerns about the availability of information and agencies have a responsibility to undertake a reasonable search for relevant, current information.

Mr. Robert Johnson
Regional Director
Lower Colorado Regional Office
September 8, 2000
Page 3

Water Rights Settlements

5

The DEIS states that "under shortage, potential impacts to Indian CAP water users differ depending upon whether CAP water is allocated under settlement or without settlement." DEIS at 3.14-13. The same holds true for municipal, industrial and non-Indian agricultural CAP water users in Arizona.

Potential allocations to CAP water users and Indian tribes are the focus of interrelated settlements involving CAP operation and repayment and Indian water rights. Phoenix has previously commented regarding the impacts to CAP allocations with or without settlement. These comments to the Draft Environmental Impact Statement, Central Arizona Project, Allocation of Water Supply and Long-Term Contract Execution are hereby incorporated by reference. They are attached hereto as Attachment A.

Sincerely,

William L. Chase

WILLIAM L. CHASE, JR.
Water Advisor

TB:cf/#105593
Enc.

5: Comment noted.

09/08/2000 12:18 4352592959 GRAND CO CLERK PAGE 02

Memo

Date: **September 8, 2000**

To: Ms. Jayne Harkins
Attention: BC00-4600

From: Grand County Council

Subject: Colorado River Interim Surplus Criteria

1 This letter is in support of the "Seven State Proposal" for Interim Surplus Guidelines on the Colorado River.

We feel this proposal will allow us to receive our allotted share of the Colorado River water while easing the burden on those states that are currently using in excess of their allotted share.

Thank you.

1: The preferred alternative in this EIS is derived from the Seven States Proposal. Reclamtion did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

STATE AGENCIES

ARIZONA POWER AUTHORITY
1810 W. Adams Street • Phoenix, AZ 85007-2697
(602) 542-4263 • FAX (602) 253-7970

SEP 14 2000

BCOO/4600
4600

Regional Director
Lower Colorado Region
U.S. Bureau of Reclamation
c/o Ms. Jayne Harkins
Attention BCOO-4600
P.O. Box 61470
Boulder City, Nevada 89006-1470
Fax Number (702) 293-8042

September 7, 2000

Re: Comments Upon the Colorado River Interim Surplus Criteria- Draft Environmental Impact Statement; 65 Federal Register 47516 (August 2, 2000)

Dear Ms. Harkins:

Please accept the following comments from the Arizona Power Authority (Authority) relating to the Draft Environmental Impact Statement for the Colorado River Interim Surplus Criteria. The Secretary of the Interior acting through the United States Bureau of Reclamation is considering adoption of criteria under which surplus water conditions may be declared in the Lower Colorado River Basin through the Year 2016. The purpose of the criteria is to ensure that the State of California returns to its normal allocation of 4.4 million acre feet of Colorado River water pursuant to the U.S. Supreme Court Decree in Arizona v. California and pursuant to Article II(3)(b) of the Criteria for Coordinated Long Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (Long Range Operating Criteria).

The Arizona Power Authority (Authority) is a public power marketer charged under Arizona State laws with responsibility for taking and marketing the State of Arizona's allocation of 377 megawatts of hydroelectric power from Hoover Dam. The Authority markets the Hoover power to 31 entities including a number municipalities and electrical and irrigation districts throughout the State of Arizona.

The Authority submits the following comments on the Draft Interim Surplus Criteria EIS:

1 | Scope of Draft EIS- Integrated Resource Planning. The Authority notes that historically that water and power resource issues on the Colorado River have been analyzed and recognized as a concomitant pair. We are concerned here that the Draft EIS does not

1: Comment noted. Reclamation believes that the level of analysis for energy resources presented in the FEIS, Section 3.10, appropriately identifies the potential effects of interim surplus criteria.

adequately recognize or analyze power generation in implementing any of the four potential Interim Surplus Criteria Alternatives.

cont'd

For example Table 2-1 goes into extensive detail as to the impacts of the various four alternatives yet dedicates only two short sentences to hydroelectric power production: ""Flood Control Alternative would be similar to baseline," and "average energy increase of <1% to 2015; decrease of 1% to 2035."

Indeed even the assumption of impacts in these two short sentences are at odds with the apparent impacts to hydroelectric power production as reflected in numerous Figures contained in Section 3.3 of the Draft EIS. The whole issue of hydroelectric power production needs greater consideration in the Draft EIS- especially since Hoover Dam power facilities play an integral role in the reliability of the power system's in the Southwest.

2

Impacts Upon Hoover Dam Hydroelectric Production. Modeled End-of-Calendar Year Lake Mead and Lake Powell Water levels Contained in Figure S-1 reflect potentially serious reductions in power production, particularly for Hoover Dam. See e.g. Figure 3.3-14 on page 3.3-27 which shows the median trend to lower elevations. Indeed that Chart reflects that the 35th Percentile Curve would approach Hoover Dam's Minimum Power Pool elevation of 1083 feet- i.e. Hoover Dam would produce no hydroelectric power at all.

3

Modeled vs. Actual Lake Mead Inflows and Impact of Drought Years . The Draft EIS bases much of its analysis of the Alternatives on "representative seasonal flows" as noted for example, on Figures 3.3-18 (a-d). The Authority is seriously concerned that the modeled flows do not comport with the actual historical unregulated flow data into Lake Mead.

We have attached a chart to show the historical unregulated flow data and average flow into Lake Mead from 1968-1997. When reviewing the data several points become apparent. First we were in an above average inflow mode for 1996-1997. Second drought periods occur for extended multi- year periods such as from 1988 through 1993 when annual inflows reached as low as 40% of normal.

In extended drought periods it seems unfair from a water perspective not to suspend or alter the applicability of the Interim Surplus Criteria, so that California shares in the natural occurring impacts of the drought period too.

Next the actual inflow data calls into very serious question the assumption in the Draft EIS (noted above in Table 2-1) that through 2015 there will be an average increase in power generation of less than one percent. In fact, in extended drought periods of more than one year (which are common) the power generating capability of Hoover Dam may be seriously and significantly impaired under all of the Alternatives.

2: Comment noted. Figure 3.3-15 of the FEIS presents the probability for Lake Mead to be below 1,083 feet msl generated from DEIS modeling is approximately 42 to 43 percent (a 58 to 57 percent probability of avoidance) under baseline conditions and each of the alternatives during the final 15 years of analysis. As noted in Figure 3.3-15, Lake Mead water levels may fall below 1083 feet msl under modeled baseline and surplus alternatives. The interim surplus criteria has the potential to draw down the Lake Mead water levels earlier but to the same levels as the baseline conditions.

3: The hydrology data used to model the operations of the Colorado River under baseline conditions and the surplus alternatives were developed using Reclamation's historic Colorado River flow measurement data, in combination with estimates of historical depletions. The resulting natural flow data represents an estimate of the flows that would have existed without storage or depletion by man. This is different than the recorded historical stream flows that represent actual measured flows. The system of measurement and adjustment for natural flows that Reclamation used for EIS analyses represents the best available information. Sections 3.3.2 and 3.3.3 discuss natural runoff and modeling of future hydrology. It is anticipated that Lake Mead water levels and Hoover Powerplant production will be affected by the conditions modeled under the baseline conditions and surplus alternatives. The relative differences in potential impacts as presented in Sections 3.3 and 3.10 are the impacts that need to be considered as being associated with the implementation of the interim surplus criteria, under the respective surplus alternatives.

Hoover Dam Lynchpin Reliability Role in Western State Power Systems. The maximum rated capacity of Hoover Dam is 2074 Megawatts. However Hoover Dam's power capacity plays an essential role in western state power systems far beyond simply the 2074 Megawatts it can produce. That role is system reliability, stability, and support. Power systems require a certain amount of power generating capacity to be held in reserve for immediate activation should any of the generators currently producing power into the system fail or shut down for any reason. Without adequate reserve capacity, failure of one generator tied into the system can quickly produce a chain reaction and cause additional generators attached to the system to fail and create a region wide blackout.

In order to prevent such a regional power failure, the regional system needs significant reserve generation that can be called on immediately to replace the failed generator. This reserve capacity is best provided by facilities with flexible response capabilities. Hoover Dam serves this function in the western regional power system. In a matter of minutes Hoover Dam can provide 2074 Megawatts of clean hydroelectric power to fill the gap and cover the problem in the grid. In addition Hoover's power can move effectively to the problem area since Hoover is connected to the Mead Substation- a major electric substation south of Boulder City from which transmission lines fan out all across the western U.S. In that sense Hoover Dam with its immediate ramping capability and massive transmission system links is a critical lynchpin that assures the reliability within the western states power grid.

Note that for the foreseeable future there is no alternative power source to replace Hoover's unique ability to respond to disturbances in the system. For example coal-fired or nuclear generating facilities have little capability to respond like Hoover. They do best at a flat rate of output. Thus they can not economically serve in a system reliability role. Gas-fired generation may be used in a peaking function assuming however that (1) that capacity is available and (2) transmission lines are installed to these facilities in order to move that power to the problem area.

However perhaps due to high natural gas prices and lack of water resources for cooling only a few plants have been permitted and less are actually under construction. The little additional power capacity that these plants will add to the total electric system will quickly be swallowed up by growing demand of cities and industry for power. Thus there appears to be no gas-fired capacity under construction that could serve in a peaking capacity and replace lost Hoover capacity. The potential loss of the Hoover resource would place the western power system already low in reserve capacity into a dangerous situation.

4

Impact Upon Authority Power Customers. The Authority delivers Hoover power to 31 Irrigation and Electrical Districts within the State of Arizona. For many districts the Hoover power is the primary source of electrical power. Thus these Districts' agricultural, residential, and industrial users will be impacted either by reduction in available power, or in the significant costs to purchase replacement power in a market where power resources are growing more difficult to obtain at reasonable prices.

5

4: Section 3.10.2.3 includes a discussion of generation ancillary services, which include peaking power. A large portion of the potential losses is included in baseline conditions.

5: See response to Comment 16-2. Impacts to individual power customers is beyond the scope of analysis in the EIS. Reclamation believes that the level of analysis for energy resources presented in the EIS appropriately identifies the potential effects of interim surplus criteria.

Hoover Dam Power Generation and Impact Upon Water Use. A 500 megawatt gas-fired power plants requires anywhere from 4,000,000 to 7,000,000 gallons of water for its cooling system and discharges 20% of that water daily. Thus if the 2074 Megawatt Hoover resource were removed from the marketplace, then four additional 500 Megawatt gas fired facilities would be required in order to replace both Hoover's capacity and its reliability role.

6 Those four generation facilities would cumulatively require an additional 16,000,000 to 28,000,000 gallons of water usage. I note this because water prices in Arizona and adjacent states have risen to the level where gas-fired power plants' economics are becoming marginal at best. That is, the availability of the Hoover resource if impaired- is in question. The reliability role of Hoover Dam could be instead lost to the western grid- a very serious issue for the foreseeable future with power reserve margins dropping throughout the West.

Summary. The Authority encourages the Bureau of Reclamation again to analyze the Draft EIS Alternatives and the data assumptions underlying them as to the power issues. Water and power resource management should be approached in the Draft EIS in an integrated fashion as has traditionally been done along the Colorado River. In solving water issues in the State of California, the current plans may be simultaneously creating equally serious power resource issues for the western region.

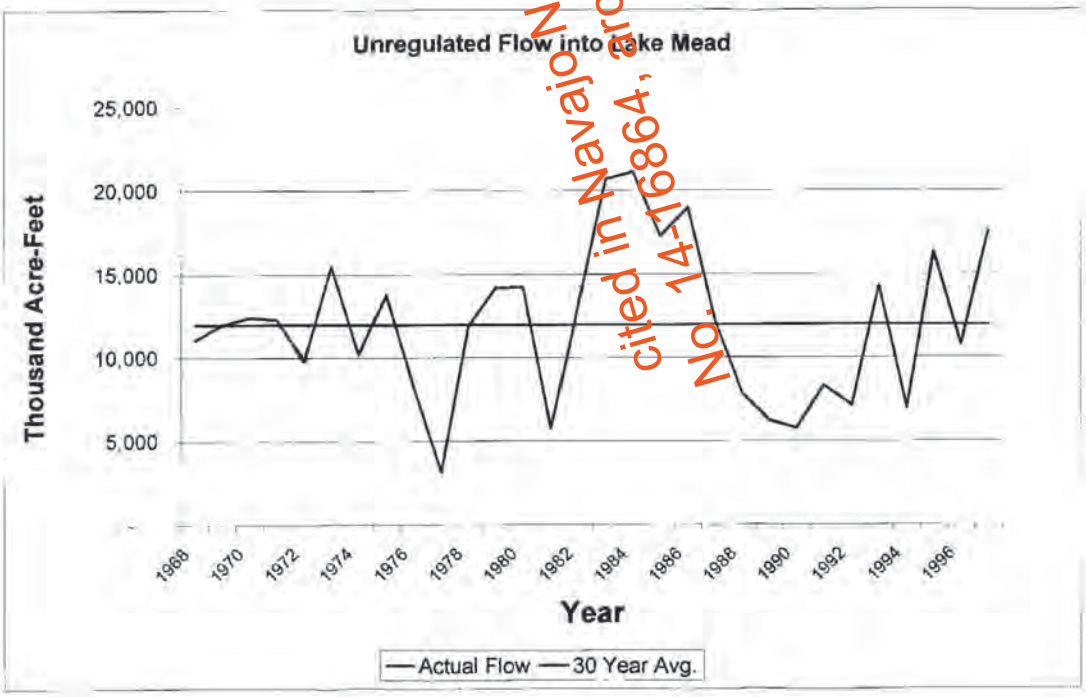
Sincerely,

Douglas V. Fant

Attachment

Mr. Douglas V. Fant
Associate legal Counsel
Arizona Power Authority

6: Comment noted.



ARIZONA POWER AUTHORITY
1810 W. Adams Street • Phoenix, AZ 85007-2697
(602) 542-4263 • FAX (602) 253-7970

September 9, 2000

Via Fax and Mail

Regional Director
Lower Colorado Region
U.S. Bureau of Reclamation
c/o Ms. Jayne Harkins
Attention BCOO-4600
P.O. Box 61470
Boulder City, Nevada 89006-1470
Fax Number (702) 293-8042

Re: Comments Upon the Colorado River Interim Surplus Criteria-Draft Environmental Impact Statement; 65 Federal Register 47516 (August 2, 2000)

Dear Ms. Harkins:

Please accept the following comments from the Arizona Power Authority (Authority) relating to the Draft Environmental Impact Statement for the Colorado River Interim Surplus Criteria. The Secretary of the Interior, acting through the United States Bureau of Reclamation, is considering adoption of criteria under which surplus water conditions may be declared in the Lower Colorado River Basin. The purpose of the criteria is to ensure that the State of California returns to its proper allocation of 4.4 million acre feet of Colorado River water pursuant to the U.S. Supreme Court Decree in Arizona v. California and pursuant to Article III(3)(b) of the Criteria for Coordinated Long Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (Long Range Operating Criteria).

The Authority is a public power marketer charged under Arizona State law with responsibility for taking and marketing the State of Arizona's allocation of 377 megawatts of hydroelectric power from Hoover Dam. The Authority markets its Hoover power to 31 Arizona entities including municipalities, electrical and irrigation districts and the Central Arizona Project.

The Authority submits the following comments on the Draft Interim Surplus Criteria EIS:

1 The draft EIS extends the National Environmental Policy Act (NEPA) analysis into Mexico. We believe that such an extension is not required by law and raises the question as to why a different approach is being taken in the Multi-species Conservation Program (MSCP). The existence of a Treaty under which the Republic of Mexico has total control over any water passing into Mexico makes such an extension meaningless. We are particularly concerned that a similar extension will be made with the Endangered Species Act (ESA). The Supreme Court has clearly stated that the extraterritorial application of statutes is proper only when the terms of the statute clearly evidence the intent of Congress to apply the statute in foreign countries. Neither NEPA nor the ESA contain evidence of such intent. If protection of species in the Colorado River Delta is to be accomplished by altering the existing accord between the United States and Mexico, that should be accomplished by a modification of the Treaty through negotiations between the State Department and its counterpart in the Mexican government.

2 On a different point, we recognize that attention has been given to certain impacts on power generation. It is important that power resource issues continue to be addressed and we look forward to cooperating in that effort.

Thank you for an opportunity to submit comments on behalf of the Authority.

Very sincerely,

Joseph W. Mulholland
Executive Director

JWH/jb

1: See responses to Comments 22-4 regarding NEPA analysis and Comment 22-10 regarding ESA application in Mexico. The MSCP is a regulatory program to address ongoing and proposed actions within the U.S.

2: Comment noted. Reclamation is pleased to work with any of the customers on resource issues.

ARIZONA DEPARTMENT OF WATER RESOURCES
500 North Third Street, Phoenix, Arizona 85004
Telephone 602-417-2410
Fax 602-417-2415

JANE DEE HULL
Governor

RITA PEARSON MAGUIRE
Director

September 8, 2000

SEP 11 2000

SENT VIA FACSIMILE TO 702-293-8042

Regional Director
Lower Colorado Region
Attn: Jayne Harkins, LC-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

The Arizona Department of Water Resources (ADWR) submits the following comments on the Draft Environmental Impact Statement (DEIS) for Colorado River Interim Surplus Criteria dated July 7, 2000. By statute, ADWR is the state agency within Arizona that is authorized and assigned the responsibility to consult, advise and confer with the Secretary of the Interior regarding matters dealing with the operation of the mainstem of the Colorado River. These comments supplement previous oral comments made on behalf of ADWR at the Bureau's public hearing held in Phoenix on August 25, 2000.

ADWR has been involved in discussions with representatives of the Colorado River Basin States and the Ten Tribes Partnership for several years. Our position regarding Colorado River reservoir management has consistently reflected that any operating criteria adopted by the Bureau must be technically feasible and legally consistent with the Law of the River, and must also be fair and objective. If there is a category of users who receive particular benefits from the proposed interim surplus criteria, then that benefit must not be realized at the expense of, or to any detriment of others. We, of course, are particularly concerned in this instance. At the present time, Arizona has the least need for use of surplus water. Arizona also faces the great risk when shortages occur because of the lower priority held by the Central Arizona Project (CAP) contractors and other post-1968 Arizona water contractors. This set of circumstances requires ADWR to take a fairly conservative viewpoint toward surplus operating criteria.

Purpose and Need for Action

The DEIS states that the purpose and the need for the proposed action is to provide more specific criteria for the Secretary to make his annual determination of the condition of the River as required by the Long Range Operating Criteria. If this was the primary purpose of the proposed action, then specificity could easily be obtained by adopting the spill avoidance methodology

described in the Bureau's 1986 Special Report entitled Alternative Operating Strategies for Distributing Surplus Water and Avoiding Spills. Arizona has supported the use of the "70R" spill avoidance strategy as a surplus criteria for many years. However, it is clear that the primary purpose for the interim criteria is to provide additional water for California water users during the 15-year period while they are implementing their California Water Use Plan. 1

California water users made a conscious and risky decision to build a reliance on water above their basic apportionment of 4.4 maf when they negotiated the Seven Party Agreement. By that Agreement, the Metropolitan Water District (MWD), who delivers municipal and industrial (M&I) water to the Southern California Coastal Plain, faces the risk of having its supply cut nearly in half if the Secretary determines that California is entitled to only its basic annual apportionment. A severe cutback in M&I supplies would potentially create an unacceptable economic disruption in Southern California. But it must also be recognized that California has received considerable economic benefits from the risk they took because they have been able to receive and use water in excess of their basic apportionment for several decades. The time has come for California to live within their basic apportionment and substantially reduce their water demands from the Colorado River.

ADWR believes that California water users have a variety of water conservation and market mechanisms available to them that will allow them to reduce their water demands, but undoubtedly those options will take some time to implement and will be expensive. The use of interim surplus water will provide a period of time to cushion that economic and financial impact. Because the implementation of interim surplus criteria is designed to deal with the issue of avoiding impacts to Southern California M&I water users, any criteria must recognize that the problem to be solved is specific and the criteria short term. When the time comes for the Secretary to limit Lower Basin deliveries to their basic apportionment, Arizona fully expects him to carry out his obligation as water master, even if that action would create negative economic impacts in Southern California.

Seven Basin States Proposal

Independent of the Bureau's ongoing planning process, representatives of the seven Colorado River basin states have been holding discussions to reach a mutual agreement on terms for interim operating criteria. The seven states have recently completed a "Working Draft for Interim Surplus Criteria Guidelines" which we presented to the Bureau for consideration. ADWR believes that this document describes the best possible set of criteria for meeting California's needs while protecting the rights and interests of others. We believe that the Seven Basin States Proposal falls well within the scope of the DEIS since it is very similar although clearly not identical to the Six States Alternative. Assuming that all of the remaining related issues concerning California's commitments to its Quantification Agreement and California Water Use Plan are resolved, Arizona will be prepared to work with the other states and the Bureau to finalize this proposal. We would then urge the Secretary to adopt the Seven Basin States Proposal as the Preferred Alternative in the Final Environmental Impact Statement (FEIS). 2

Arizona believes that its participation in formulating a consensus Basin States proposal is fully consistent with Secretary Babbitt's policy. In his December 17, 1998 speech before the Colorado River Water Users Association he stated:

1: As discussed in the purpose and need, the purpose is to provide "a greater degree of predictability" of when surplus water is and is not available. Reclamation agrees that the spill avoidance methodology of 70R would meet the purpose and need of the proposed action. Reclamation agrees that interim surplus criteria would complement California's efforts to reduce its water use.

2: The preferred alternative in this FEIS is derived from the Seven States Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

"As to the substance of the surplus guidelines, I am aware of the proposal prepared by six of the seven basin states dated December 4th. On this issue, as on others, I reiterate my preference that all the basin states search for a recommendation on which they can agree. In light of California's needs, and the restrictions relating to surplus in Article II(B)2 of the Supreme Court decree in *Arizona v California*, it would be particularly helpful for California to engage with the other basin states in an effort to find common ground. The time is now right for California and the other states to work together to negotiate surplus guidelines that will adequately recognize the achievement implicit in the steps California is taking in reducing its reliance on Colorado River water by providing assurances that Met's aqueduct can remain full during the intensive period of conservation that lies ahead."

We believe that the Seven Basin States Proposal does exactly what Secretary Babbitt requested. It is a very specific proposal and was carefully and purposefully negotiated. We recognize that the Bureau, using the NEPA planning process, is obligated to give consideration to a variety of factors. As with any work product, there is probably room for improvement. However, ADWR wants to caution you against making significant or substantive changes or we may need to withdraw our support for the consensus proposal. In particular, the provision that requires the Secretary to terminate the guidelines in the event California has not implemented conservation measures to reduce its demand for surplus by certain milepost dates must be included. This requirement must be non-discretionary. We note with concern that the DEIS (§S.2.6) describes a similar requirement for demonstrating progress with the term "may be contingent" rather than the term "shall terminate." It is equally critical that the Secretary agrees that the surplus criteria guidelines will revert to the "70R" baseline when the interim criteria terminate.

3

4

Planning Process

ADWR has been an active participant in numerous Bureau planning programs over the years. In this case, the Bureau chose to fully integrate its planning effort into its NEPA review process. From our perspective this approach has been deficient. Aside from the reduced amount of time it will take to reach a decision, this process has generally been a step backward by the Bureau in terms of public participation and involvement in the planning process. While a series of DEIS scoping meetings were conducted, those meetings were very general and did not provide adequate opportunities to interact with the Bureau's planning team. The outcome of this process is that Bureau planners developed a series of inadequately developed and poorly explained alternatives for presentation in the DEIS. As the Bureau moves forward to complete its FEIS, we hope that the process will be more inclusive when refining the alternatives under consideration and the assumptions used in the modeling and baseline condition analysis. Most important, the Basin States must have adequate opportunity to present and explain the intent and ramifications of statements contained in the Seven Basins States Proposal.

5

Other Comments

- A surplus methodology of 75R was used as the baseline when 70R has been the standard in terms of discussions of surplus criteria. The FEIS should be changed to reflect 70R-spill avoidance strategy as the baseline surplus criteria.

6

3: Please see response to Comment 33-3.

4: Upon termination of the interim surplus criteria the Secretary's procedure for determining surplus, normal, or shortage conditions would revert back to the AOP process, in which numerous factors are considered as discussed in Chapter 1. While the 70R strategy is mathematically convenient as a representation of the baseline, it is only one of the factors considered by the Secretary in the AOP process.

5: Reclamation appreciates the willingness of state and local agency representatives to participate in a dialogue on the interim surplus criteria during the NEPA process. This has been of assistance in compiling water demand projections and other operational aspects for the analysis.

6: The 70R strategy is used for the baseline in this FEIS. For more information, see response to Comment 57-11.

As stated on page 2-1, "The 70R strategy was eliminated from consideration as an alternative in this DEIS because modeling results from 70R strategy are very similar to the Flood Control Alternative, which is evaluated in this DEIS." This rationale is not sufficient justification to eliminate a strategy that has been used for many years as a baseline for surplus criteria. The proof that 70R has been used as the baseline before the publication of this DEIS is stated unambiguously on page 2-5, "Reclamation has utilized a 70R strategy for both planning purposes and studies of surplus determinations in past years."

6 cont'd

Also, on page 2-5, the DEIS states, "When Reclamation reviewed previous surplus determinations as part of this DEIS effort, the data indicated that the 1997 surplus determination did not precisely fit the 70R strategy. Therefore, in an attempt to characterize recent operational decisions in a manner that could be modeled for baseline purposes, Reclamation determined that a 75R strategy would provide a more accurate representation of "no action" than a 70R strategy." There is no explanation for the selection of the 1997 surplus determination as the representative year that characterizes recent operational decisions. We do not believe that 1997 was a representative year. Furthermore, we dispute the contention that the intent of the surplus decision was to change the 70R criteria as the baseline. 70R should be the baseline assumption for analysis purposes in the FEIS.

The DEIS also states on page 2-5, "While the 75R strategy is used to represent baseline conditions, it does not represent a decision by Reclamation to utilize the 75R strategy for determination of future surplus conditions." Arizona strongly agrees with this decision and would not support the use of the 75R strategy to determine future surplus conditions merely because this strategy was used as the "no action" baseline for this DEIS. We strongly suggest that 70R be used as a baseline and thereby avoid creating any erroneous future expectations.

- The descriptions of both the assumed baseline 75R criteria and the Flood Control Alternative indicate that once a threshold determination is made, a surplus is declared. The surplus volume is apparently unquantified and water is made available to all CAP contractors for surplus water. We believe that such an approach, even if it has been past practice, is inconsistent with the intent of Section II(B)(2) of the *Arizona v California* decree. It is the intent of the decree that the Secretary determine a volume of water available for surplus and then distribute that water 50% to California, 46% to Arizona, and 4% to Nevada. The Bureau's method circumvents that process. By simply requesting a supply greater than half of the overall demand, California would receive more than its legal share of surplus. We believe the DEIS, and the Bureau's current practice, need to be revised to recognize the restrictions relating to surplus in Article II(B)(2) of the Supreme Court decree.

7

- The proposed Six States Alternative is based on the document dated December 4, 1998 presented in Attachment D. As one of the participants in the development of the Six State paper, ADWR questions why the Bureau did not adopt that proposal as it was presented, rather than making modifications to it. For example, the Six States paper uses a surplus tier based on a 70 R strategy, but the Bureau alternative changed that tier to 75 R. (Although the Draft Guideline presented in Attachment H refers to the 70th percentile runoff not the 75th percentile.) In preparing the guidelines for the Six State Alternative the volume of surplus under two of the tiers appear to be inconsistent with the volumes that were modeled using the

8

7: Reclamation and the Department agree that the determination of surplus must be consistent with Article II(B)(2) of the Decree in Arizona v. California. The assumption that the Baseline and Flood Control Alternative declare a "full surplus" (unquantified surplus), reflects the fact that the system is relatively full under those conditions.

8: Reclamation used the 75R strategy for the upper tier of the Six States Alternative and for the period of analysis after the end of the interim period. Because 75R was selected as the baseline, Reclamation was concerned that the use of 70R as presented in the Six States Proposal would introduce inconsistencies into the modelling and compromise the results. In as much as 70R is being used for the baseline in this FEIS, the descriptin of the Six States Alternative will include 70R operation as initally proposed by the States. The inconsistencies in descriptions have been corrected.

8 cont'd tables in Attachment G. This inconsistency leads us to question if the Bureau has accurately evaluated this alternative.

9 • The Shortage Protection Alternative, described beginning on page 2-13, should not have been included as an alternative, because it is an inappropriate operating mode for the reservoir. Operating the reservoir under these criteria would provide an excessive amount of surplus water to California at the expense of the junior water right holders in Nevada and Arizona. It would be irresponsible to use such a mode of operation where the benefits to the Lower Basin states would be so inequitable.

10 • Upper Basin depletions were based on 1996 projections, as stated under Common Modeling Assumptions on page 3.3-9. More recent projections are available and should be used in the FEIS if possible. Current depletion data should be incorporated into the model because actual reservoir elevations from January 1, 2000 are used.

11 • The DEIS states on page 3.3-9 that the baseline No Action Alternative and the Flood Control Alternative did not include the implementation of the California 4.4 Plan. Some water transfers have been agreed to, including the IID to MWD transfer 1988 agreement. Any water transfers that are completed should be included in the assumptions.

12 • The Lower Basin depletion schedules shown in Attachment G do not coincide with the most recent schedules being used in modeling efforts by the Basin States, including the schedule for Normal conditions with the California transfers. Under the most recent version of the Seven Basin State Proposal as published in the federal register, MWD's demand during the interim period for a Full Domestic Surplus should be 1,250 kaf instead of 1,212 kaf.

13 • As stated on page 3.4-5, "The CAP shortage condition depletion schedule used for the analysis remains constant at 1.0 maf over the period of analysis. Additionally, there will also be other shortage condition reductions that affect CAP priority contractors that use water directly from the Colorado River. This quantity is not quantified, however, normal year supplies could be reduced by as much as 35 percent." This is an incorrect description of the Arizona supply during a shortage year. Under the current modeling method, which limits the CAP supply to 1.0 maf, the shortage applies equally to the CAP supply as well as to the on-river Priority 4 water users. Therefore, the Arizona supply to all Priority 4 users would be limited to 1.0 maf, without additional reductions applied to on-river contractors. As a clarification, the shortage year supply could be reduced from a normal year supply by as much as 35%. Under the Seven Basin State Proposal, the total Arizona supply would be reduced to 2.3 maf, as described above.

14 • The DEIS projects that the interim period ends in 2015. The Seven Basin States Proposal assumes the end of the interim period is 15 years after it begins. Given the timing of implementation of the record of decision for this EIS and the schedule of completion for the California Quantification Agreement, it more likely that the interim period will start in 2001 and end in 2016.

15 • ADWR believes the Bureau has mis-characterized and therefore incorrectly analyzed the potential impacts of shortages on CAP Indian Trust Assets in Section 3.14.3. The Record of

9: Comment noted. Reclamation formulated the Storage Protection Alternative as an approximation of the maximum amount of surplus water that could be determined during the interim period, while maintaining a certain amount of water in storage for protection against future shortages.

10: Revised depletion schedules provided by the Basin States were used in analyses for the FEIS. See response to Comment 14-10 for more detail.

11: For the FEIS, intrastate transfers were considered and modeled in all five surplus alternatives that were evaluated in the FEIS. This includes the 1988 IID/MWD agreement. The baseline (No Action) conditions were modeled with and without the transfers. A sensitivity analysis comparing a baseline with and without transfers to the Seven Basin States alternative, was conducted to evaluate the sensitivity of the transfers. Please see Appendix L of the FEIS for the results of this sensitivity analysis and Section 3.4 for the results of the water supply analysis.

12: Revised depletion schedules provided by the Basin States were used in analyses for the FEIS. See response to Comment 14-10 for more detail. The Lower Division depletion schedlues are Attachment H of the FEIS.

13: See response to Comment 14-11 regarding Arizona shortages.

14: The interim surplus criteria alternatives under consideration would be used in years 2001 through 2015 to make surplus determinations for the next year. Thus, water deliveries in years 2002 through 2016 would be subject to interim surplus criteria. Discussion has been added to Chapter 2 of the FEIS to provide clarification.

15: ADWR's comment is noted. ADWR and Reclamation have a rather longstanding difference of opinion regarding shortage impacts on CAP. Under the GRIC Settlement, it is hoped that a resolution of this disagreement may be reached. The disagreement is over which priority takes a reduction first; the CAP fourth priority (M&I water greater than 510,000 AF) or the CAP third priority requiring a reduction of 25 percent of GRIC agricultural water and 10 percent of other CAP Indian agricultural water.

15 cont'd

Decision Dated February 10, 1983 issued by Secretary of the Interior James Watt describes the shortage sharing provisions as follows:

> "During years of water supply shortages, Indian users and non-Indian M&I uses would share a first priority on project water supplies. Depending upon severity of shortages, miscellaneous uses would be reduced pro rata until exhausted; next, non-Indian agricultural uses would be reduced the same way until exhausted; next 25 percent of the Gila Tribe allocation and 10 percent of the irrigation amount allocated to Indian contractors other than the Gila Tribe would be reduced pro rata until exhausted. Finally, the remaining water contracted for by 11 Indian entities under existing contracts and 75 percent of the Gila Tribe allocation would share a priority with 510,000 acre feet of non-Indian M&I uses ...and would be reduced on a proportional basis, and within each class on a prorated basis, based on the amount of water actually delivered to each entity in the latest non-shortage year."

While this ROD language, which is incorporated by reference in CAP M&I subcontracts, clearly describes the order in which reductions should take place, the Bureau's description of the priority system in the DEIS includes a fourth priority that reduces M&I to 510,000 acre feet before requiring the reduction by 25% to GRIC agriculture and 10% to the other tribes agriculture. The DEIS needs to be corrected to reflect that CAP third and fourth priorities have been reversed. In addition, the proposed GRIC settlement contains a provision that would modify the shortage sharing formula. Since the DEIS describes the CAP water supply conditions if the GRIC settlement is included, that description should be based on the new shortage sharing formula.

ADWR looks forward to working with the Bureau to complete the planning process leading to the implementation of the Interim Surplus Guidelines of the Colorado River. If you have any questions regarding our comments, please contact Herb Dishlip at 602-417-2440.

Sincerely,

Rita Pearson Maguire

Rita Pearson Maguire
Director

RPM:tjm

AUG-31-2000 16:48 P.02/05

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • WWW.AZGFD.COM

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August 31, 2000

Mr. Robert W. Johnson
Regional Director
ATTN: Jayne Harkins (LC-4600)
U.S. Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Re: Draft Environmental Impact Statement for the Colorado River Interim Surplus Criteria

Dear Mr. Johnson:

The Arizona Game and Fish Department (Department) has reviewed the "Draft Environmental Impact Statement, Colorado River interim Surplus Criteria," dated July 2000. Comments of the Arizona Game and Fish Department are based on the following provisions of Arizona law:

> "Wildlife, both resident and migratory, native or introduced, found in this state except fish and bullfrogs impounded in private ponds or tanks or wildlife and birds reared or held in captivity under permit from the commission [Arizona Game and Fish Commission], are property of the state and may be taken at such times, in such manner, and with such devices as provided by law or rule of the commission." (Arizona Revised Statutes § 17-102)
>
> "The laws of the state relating to wildlife shall be administered by the game and fish department. Control of the game and fish department is vested in the game and fish commission." (Arizona Revised Statutes § 17-201)
>
> "The [Arizona Game and Fish] Commission shall:"
> "2. Establish broad policies and long range programs for the management, preservation and harvest of wildlife."
> (Arizona Revised Statutes § 17-231)

The Arizona Game and Fish Department, therefore, has a trust responsibility for all fish and wildlife within the territorial jurisdiction of the State of Arizona.

AN EQUAL OPPORTUNITY REASONABLE ACCOMMODATIONS AGENCY

AUG-31-2000 16:49 P.03/06

Mr. Robert W. Johnson
August 31, 2000
2

Further, on October 16, 1987 the Arizona Game and Fish Commission formally adopted the following policy, titled "Riparian Habitat", in open public session:

> "It is the policy of the Arizona Game and Fish Commission that the Department shall recognize riparian habitats as areas of critical environmental importance to wildlife and fisheries. The Department shall actively encourage management practices that will result in maintenance of current riparian habitat, and restoration of past or deteriorated riparian habitat...."

The Department is the state wildlife agency for the purposes of consultation by Federal agencies pursuant to provisions of the Fish and Wildlife Coordination Act (16 USC 662 *et seq.*)

1 The Department is concerned about the limited geographic scope of the discussion of effects of the alternatives to aquatic resources and special status species. The analysis should be revised to be complete, including analysis of affects to angling throughout the project area. If impacts to aquatic or special status species are identified after additional analysis, measures to mitigate those impacts should be included. Page specific comments are included herein as an attachment.

We appreciate the opportunity to comments on the referenced document. If you have any question please contact Mr. Bill Werner at 602-789-3607.

Sincerely,

Duane L. Shroufe
Director

DLS:ww

attachment

1. Potential effects on special-status species that could occur between Hoover Dam and the Southern International Boundary have been included in Section 3.8 of the FEIS. Potential effects on sport fisheries from potential changes in the temperature of water released from Hoover Dam has been developed and included in Section 3.7.3 of the FEIS. No specific mitigation measures are considered necessary for the impacts identified. However, Section 3.17 has been added to the FEIS to discuss environmental commitments.

AUG-31-2000 16:49 P.04/05

Attachment
Arizona Game and Fish Department
Specific Comments By Page
Draft Environmental Impact Statement
Colorado River interim Surplus Criteria, dated July2000.

Page 3.2-1, Section 3.2, paragraph 3

2 The southerly boundary is described as the Northerly International Boundary. It is not clear why this point on the river is used instead of the Southerly International Boundary at San Luis. If the international boundary along the river is generally the 1972 centerline alignment between the Northerly and Southerly International Boundaries, a significant amount of riparian vegetation, including vegetation providing habitat for the Southwestern willow flycatcher, occurring in the United States, may not have been included in the analysis.

2: The area of potential effect has been expanded for the FEIS to include consideration of the Colorado River 100-year floodplain to the Southerly International Boundary. Potential effects on special-status species have been included in the FEIS in Section 3.8.

Page 3.3-33, Map 3.3-1

3 "Bil Williams" should be Bill Williams.

3: This change has been made.

Page 3.3-35, Figures 3.3-18 a-d

4 The heading "Colorado River Seasonal Flows Downstream of Havasu NWR" is not consistent with the location shown on page 3.3-33, Map 3.3-1 for "3. Colorado River at Havasu NWR." The downstream end of Havasu NWR is in Lake Havasu itself. The location marked on Map 3.1 is about at the upstream end of Havasu NWR. The location for which the modeling was completed should be clarified.

4: The headings on Figures 3.3-18a to 3.3-18d are correct. The respective river location shown on Map 3.3-1 has been corrected.

Page 3.3-41, Section 3.3.4.5.3, paragraph 3

5 The description that

> "The river location that was modeled for this reach is located immediately downstream of the Palo Verde Irrigation District."

is not consistent with the location shown on Map 3.3-1 which shows the point just below Palo Verde Diversion dam, at the upstream end of the District. Again, the location for which the modeling was completed should be clarified.

5: The subject river location modeled is immediately downstream of the Palo Verde Diversion Dam. The text has been revised to reflect this location.

Page 3.6-7, Section 3.6.1.3

6 An explanation should be included of what infrastructure of the Wellton-Mohawk Irrigation and Drainage District has been damaged by historic flood flows on the Colorado River. Such infrastructure is more likely impacted by Gila River flood flows.

6: The description of the affected environment in the reach from Parker Dam to Laguna Dam has been corrected by deleting discussion of the Wellton-Mohawk Irrigation and Drainage District facilities. These facilities are not subject to damage from flooding on the Colorado River.

AUG-31-2000 16:49 P.05/06

AGFD Attachment
August 31, 2000
2

Page 3.7-1, Section 3.7.1

It is not clear why the analysis of impacts to aquatic resources is limited to:

> "...potential effects to Lake Mead and Lake Powell aquatic species habitat and potential effects to sports fisheries on Lake Powell and Lake Mead."

7

when the geographic area is described on page 3.2-1:

> "...the northern limit of the potentially affected area under consideration in this DEIS is the upper reaches of Lake Powell. The southern limit is the Northerly International Boundary (NIB) between the United States and Mexico."

Effects of the alternatives throughout the area described above should be analyzed and discussed. Without such analysis and discussion impacts to Arizona trust resources may not have been addressed.

Page 3.7-2, paragraph 4

8

"Uupper Basin" should be Upper Basin.

Page 3.7-8, Section 3.7.3.3.2

The statement that:

> "The primary sportfish in the Colorado River is rainbow trout."

9

is in error when the project area is the upper end of Lake Powell to the Northerly International Boundary. Clearly warm water species such as largemouth bass and catfish are found in significant numbers below Hoover Dam. Warm water species in that area are important to many anglers from Arizona, Nevada, and California.

Page 3.8-1, Section 3.8.1

It is not clear why

> "...the section addresses only special status species associated with Lake Powell, Lake Mead, the Lower Grand Canyon along the Colorado River, and the lower Virgin River."

10

when the geographic area is described on page 3.2-1:

> "...the northern limit of the potentially affected area under consideration in this DEIS is the upper reaches of Lake Powell. The southern limit is the Northerly International Boundary (NIB) between the United States and Mexico."

7: Although the area of potential effect of interim surplus criteria extends from Lake Powell to the SIB (NIB in DEIS), the resource analysis focuses on more limited areas within the area of potential effect to address specific issues identified as having the potential to be affected by interim surplus criteria. As discussed in response to Comment 38-1, an additional issue associated with sport fisheries and sport fishing has been included in the FEIS.

8: This correction has been made in the FEIS.

9: As discussed in Section 3.7.3 of the DEIS, the section addresses sport fisheries in Lake Powell and Lake Mead only. For the FEIS, additional information regarding sport fishing and the potential effects of interim surplus criteria on the temperature of water released from Hoover Dam and associated effects on sport fishing in the lower Colorado River between Hoover Dam and Lake Mohave has been added to Section 3.7.3. Reclamation has determined that fluctuations in flows below Hoover Dam to the SIB under the alternatives would be within the historical operating range of the river and would, therefore, not affect aquatic resources within this segment. Note also that the statement "the primary sport fish in the Colorado River is the rainbow trout" has been removed.

10: The analysis of effects to special-status species has been revised to include discussion for species that may occur in the potentially affected area from Lake Powell downstream to the SIB.

AUG-31-2000 16:50 P.05/06

AGFD Attachment
August 31, 2000
3

Page 3.9-34, Section 3.9.5

11 Affects to all fishing in the project area should be addressed not just reservoir fishing. This is a serious issue to the Department.

DIST-1

It is not clear what agency:

12 "AZ Department of Fish and Wildlife Service"

refers to. In Arizona, the state wildlife agency, as defined in statute, is the Arizona Game and Fish Department.

11: Reclamation has determined that recreation (including sport fishing) within the river corridor between Glen Canyon Dam and Lake Mead would continue to be addressed through the Adaptive Management Program and would, therefore, not be affected by interim surplus criteria (discussion of this Adaptive Management Program as it relates to sport fishing and recreation has been added to Sections 3.7.3 and 3.9.5 of the FEIS). As stated in Section 3.7.3, it is believed that minor changes in water temperature below Hoover Dam are not expected to adversely affect fish populations. Reclamation has determined that fluctuations in flows below Hoover Dam to the SIB under the alternatives would be within the historical operating range of the river and would, therefore, not affect sport fishing within these areas.

12: The Distribution List has been corrected to read "Arizona Game and Fish Department."

TOTAL P.06

STATE OF CALIFORNIA - THE RESOURCES AGENCY GRAY DAVIS, Governor

COLORADO RIVER BOARD OF CALIFORNIA
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GLENDALE, CA 91203-1035
(818) 543-4676
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TRANSMITTED VIA FACSIMILE & US MAIL

September 8, 2000

SEP 11 2000

Mr. Robert W. Johnson
Regional Director
Lower Colorado Region
Attn: Jayne Harkins, LC-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Re: Comments on Colorado River Interim Surplus Criteria
Draft Environmental Impact Statement – July 2000

Dear Mr. Johnson:

The following comments supplement the comments submitted by the Colorado River Board in its letter dated June 29, 1999.

The Colorado River Board of California (CRB) wishes to recognize and appreciates the enormous amount of effort and time that has been expended to date by the Department of the Interior, especially Deputy Secretary David Hayes, and the staff of the Bureau of Reclamation's (Reclamation) Lower Colorado Region office in facilitating the development of the interim surplus criteria for the Lower Colorado River among the various parties and stakeholders. As you are aware, California is committed to implementing its proposed "Colorado River Water Use Plan" dated May 11, 2000 (Plan). Interim surplus criteria for the Lower Colorado River is a vital component of the Plan. The representatives of the Governors of the seven Colorado River Basin States have submitted a "Working Draft for Interim Surplus Criteria Guidelines" for inclusion in the final environmental impact statement which Reclamation published in the August 8, 2000 issue of the *Federal Register* (volume 65, No.153). The CRB supports the seven Basin States' Working Draft for Interim Surplus Criteria Guidelines as the preferred course of action. 1

It is the CRB's understanding that Reclamation has requested that representatives of the Colorado River Basin States provide Reclamation with updated projections of demand for Colorado River water for Reclamation's use in the FEIS. California is in the process of fulfilling Reclamation's request taking into account the Plan and the Working Draft for Interim Surplus Criteria Guidelines.

Sincerely,

Gerald R. Zimmerman
Executive Director

1: The preferred alternative in this FEIS is derived form the Seven State Proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

California Regional Water Quality Control Board
Colorado River Basin Region

Winston H. Hickox
Secretary for
Environmental
Protection

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73-720 Fred Waring Drive, Suite 100, Palm Desert, California 92260
Phone (760) 346-7491 • FAX (760) 341-6820

Gray Davis
Governor

September 25, 2000

Attn: Jayne Harkins Regional Director, Lower Colorado Region Bureau of Reclamation P.O. Box 61470 Boulder City, NV 89006-1470

RE: "COLORADO RIVER INTERIM SURPLUS CRITERIA DRAFT ENVIRONMENTAL IMPACT STATEMENT"

On July 31, 2000, the California Regional Water Quality Control Board - Colorado River Basin (Region 7) received a document entitled "Colorado River Interim Surplus Criteria Draft Environmental Impact Statement" (EIS), dated July 2000, State Clearing House Number 2000074010. The Department of Interior, Bureau of Reclamation (Bureau) developed and submitted the EIS, which presents a proposed federal action to adopt interim surplus water criteria for the Lower Colorado River Basin. Surplus water conditions are defined in the EIS as the presence of conditions within the Colorado River reservoirs that would allow the Bureau to supply the Lower Basin States (Arizona, California, and Nevada) with a quantity of water in excess of the "Law of the River" annual apportionment (2.8 million acre feet (maf), 4.4 maf, and 0.3 maf, respectively, totaling 7.5 maf). The EIS presents five alternative interim surplus water criteria for Colorado River Basin reservoirs and an environmental analysis of each alternative. The five alternatives, which are being considered for adoption by the federal government, are: (1) No Action, (2) Flood Control, (3) Six States, (4) California, and (5) Shortage Protection. The adopted criteria will be incorporated into the "Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968" (Long-Range Operating Criteria (LROC)), will be used in the development of the "Annual Operating Plan" (AOP), and will be in effect through the year 2015. The predicted benefits of the proposed action are to assist the Secretary of the Department of Interior (Secretary) with decisions regarding apportionment of water within the Lower Basin States, provide an increased level of predictability of surplus conditions and quantity of available water on an annual basis, and assist with efforts to reduce California's diversion of Colorado River water to 4.4 million acre feet per year. A preferred alternative is to be selected in the future.

Region 7 appreciates the opportunity to provide comments on this proposed action and congratulates the Bureau on their efforts analyzing the environmental impacts of the five alternatives. However, the EIS inadequately addresses the affected area and water quality impacts. There are several issues that need to be considered which may assist with the comparative analyses of the proposed alternatives and the criteria selection process.

1 The proposed affected area, as defined in the EIS, is the "Colorado River corridor as defined by the 100-year flood plain and reservoir maximum water surface elevations". Such a limited area addresses only a fraction of the region that may be impacted by the proposed action and is dependent on diversions of Colorado River water for various purposes. Such an approach precludes a thorough and comprehensive assessment of the proposed alternatives. **The proposed affected** area should be expanded to include the entire region within the Lower Division States that are dependent on the Colorado River as a water supply.

California Environmental Protection Agency

Recycled Paper

1: Off-river effects of storage and use of surplus water have been or are being addressed in existing or ongoing NEPA and/or CEQA/CESA compliance documents as appropriate. These activities are authorized by state actions, and include the Quantification Settlement Agreement PEIR, Secretarial Implementation Agreement EA, IID/SDCWA Transfer EIS/EIR, and the San Diego County HCP. The federal government does not have jurisdiciton over groundwater aquifers, recharge sites or other off-stream storage sites within the states.

Jayne Harkins

-2

September 25, 2000

2 Regarding potential water quality impacts, the Bureau assess two issues in the EIS: salinity of the Colorado River water and the water quality and contaminant concentrations in the vicinity of the Southern Nevada Water Authority intake locations on Saddle Island in Lake Mead. Once the affected area is expanded, as recommended above, additional potential water quality issues also will need to be addressed. Particular issues of concern within this Regional Board boundaries are water quality impacts of groundwater and surface waters that can be caused by a reduction of freshwater flows into the Region. The main water quality problems in this Region's surface waters (e.g., Salton Sea) are primarily associated with nonpoint source pollution (e.g., agricultural return flows). The severity of these problems, like salt concentrations in the Salton Sea and selenium concentrations in the Sea's tributaries, can be exacerbated by any reduction of freshwater inflows into the Region. Conversely, the problems can be somewhat mitigated by an increase of freshwater flows into the Sea. The EIS should address these two issues.

3 In the EIS the Bureau establishes a baseline condition, using a spill avoidance strategy referred to as 75R, at a "value for which 75 percent of the historic natural flow at Lee's Ferry is less than this **value (18.1 maf).**" The baseline condition is used in the EIS for modeling and comparative analyses of the alternatives, and is proposed by the Bureau since it closely resembles surplus criteria presently used by the Secretary. Such a strategy considers one hydrologic condition, however as illustrated in the EIS Figure 3.3-1 the annual Colorado River flows are highly variable, ranging from an approximate minimum of 5 maf to an approximate maximum of 24 maf. Establishing additional baseline conditions at extreme conditions, drought and excessively wet years, will provide a broader perspective of potential climatic scenarios and hydrologic conditions, and may assist in the criteria selection process.

4 Within the EIS there are several graphs comparing alternatives for the period from 2000 through 2050. Such graphs provide useful information. However, the 50-year timeframe requires the application of a large vertical scale, which precludes a comparative analysis of the alternatives, such as Figure 3.3-7. The Bureau should consider the benefits of two graphs one for the period 2000 through 2015 and one for the period from 2015 through 2050, and the application of a vertical scale that enables the comparison of the alternatives. As presented, due to the applied scale, there appears to be an insignificant difference between the alternatives on several issues, which may not be the case. Additionally, the Bureau should consider the benefits of revising the vertical scale of the "Comparison of Colorado River Flow" graphs in Attachment L of the EIS.

If additional input is required I may be reached via email at grlb@rb7.swrcb.ca.gov or by phone at (760) 674-8142.

BEATRICE GRIFFEY
Associate Engineering Geologist

BG: kt

File: CR GC

California Environmental Protection Agency

Recycled Paper

2: Return flows into the Salton Sea are the subject of the Salton Sea Restoration Project EIR/EIS and specific conservation activities proposed by the Imperial Irrigation District related to the transfer of conserved water to San Diego and reduced return flows to the Salton Sea are being addressed in the forthcoming EIR/EIS. Reduction of freshwater tributary inflows into the Salton Sea is not affected by or within the scope of the federal action addressed in this EIS. Water quality of tributary inflows/return flows is regulated by the Board, California Department of Heath Services, and EPA.

3: The baseline spill avoidance strategy referred to in the comment utilizes a unique flow, for which associated effects are used to determine surplus conditions. A full range of historical flows were used to evaluate the baseline. See response to Comment No. 31-8 for a discussion of flows used for evaluation in the FEIS.

4: It is useful to depict the results for the total 50 year period of analysis on a single figure to present a complete picture of what happens during the interim surplus criteria and the ensuing 35 year period. In some instances, different presentations for the two noted periods were included when such information was thought to be appropriate. Additionally, the vertical scale is varied, where needed, to focus on the results being presented.

STATE OF COLORADO

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DEPARTMENT OF NATURAL RESOURCES

September 11, 2000

BCOO 4600

Ms. Jayne Harkins
Attention BCOO-4600
U.S. Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

Dear Ms. Harkins:

On behalf of the State of Colorado, I am writing to comment on the Bureau of Reclamation's July 2000, "Colorado River Interim Surplus Criteria Draft Environmental Impact Statement" (DEIS). The Colorado Department of Natural Resources includes the Colorado Water Conservation Board, the agency charged with promoting the protection, conservation and development of Colorado's water resources in order to secure the greatest utilization of those resources for the benefit of present and future generations. It is our mission to ensure that Colorado's water is protected for use of future generations, and that its compact obligations are enforced under the Law of the River.

Colorado supports the effort to develop workable interim surplus criteria for the lower Colorado River that will assist California in reducing its use of Colorado River water to its allotted 4.4 million acre-feet ("maf"). The complexity of the operations of the lower Colorado River, and the Law of the River, always make clear and concise descriptions of the background and a proposed action a challenge. In general, the DEIS fairly describes the purpose and need for the criteria, and the affected environment, and analyzes an appropriate range of alternatives. However, it is more clear if that section of the document specifically referred to the 4.4 Plan as the primary reason for the discussion of interim surplus criteria. In addition, there are a few significant areas in the discussions where the Law of the River and river operations have not been accurately stated:

1

- **Use of the 75R strategy to describe the no action alternative** -- The 70R Strategy, not the 75R, has been the Colorado River reservoir operating strategy since the mid 1980's with only one exception. While the 75R strategy has been reviewed on occasion as part of the annual operating plan development, it has never been the standard and should not have been used to describe the no action alternative.

2

- **Section 1.4.2 Glen Canyon Dam Operations** -- The discussion of Glen Canyon operations is not precisely accurate. The Colorado River Compact requires that the Upper Division States not deplete the flow at Lee Ferry below an aggregate of 75 maf for any period of 10 consecutive years (plus ½ of the Mexican Treaty delivery deficiency, if any). The 8.23 maf per year minimum objective release identified in the Long Rang Operating Criteria should not be confused with compact requirements, and this section and any others should be revised to accurately reflect what the compact requires.

3

- **Section 3.16.6 Preliminary Summary of Effects to Special-Status Species and Habitat in Mexico** -- We strongly disagree with the inclusion of this information, as it is beyond the scope of NEPA and ESA consultation requirements. The allocation and delivery of Colorado River

4 cont'd below

1: See response to Comment 11-9.

2: The 70R strategy is used for the baseline in this FEIS. See response to Comment 57-11 for additional information.

3: Glen Canyon Dam is operated according to the LROC as discussed in Section 1.4.2. Section 1.3.3 discusses the LROC and the process for review and modification of the LROC. This EIS does not address disparities between the LROC and the Colorado River Compact. Concerns over the relationship between the Colorado River Compact and the LROC should be addressed through the LROC review process.

4: See response to Comments 22-4 and 22-10.

4 cont'd

water to Mexico is established and controlled by international treaty. As the DEIS acknowledges, Reclamation has absolutely no control over what happens with water deliveries and to these species outside the borders of the United States. It is therefore beyond the scope of Reclamation's authority, confusing, and unnecessary to attempt to evaluate any possible effects of water deliveries to Mexico on these species. Reclamation has not included such information in other Environmental Impact Statements of comparable impact and it is inappropriate to do so here

5

While we feel it is necessary to point out the more significant inaccuracies, they do not affect the analysis or conclusions of the DEIS, which fairly portrays the potential impacts of the possible actions. Likewise, there are a number of other statements expressed in the DEIS concerning the Law of the River with which Colorado disagrees or does not fully concur. Again, because these differences do not significantly impact the results of this DEIS, we do not see any merit in identifying them all, commenting on them or debating them in the DEIS process. Still, Colorado wants it clearly understood that its concurrence with the DEIS and its analyses does not indicate concurrence with all statements concerning the Law of the River in the DEIS. We strongly encourage Reclamation to include in the final EIS the usual disclaimer it uses to address the differences that exist with respect to the Law of the River.

6

Regarding the selection of a preferred alternative, Colorado supports the Interim Surplus Criteria developed by the seven Colorado River Basin States and noticed in the Federal Register on August 8, 2000 as supplemental information to the DEIS. These criteria are a modification of the six-state proposal described in the DEIS. The seven-state proposal is preferable to the six-state proposal set out in the DEIS because it provides the water supplies sought with an acceptable level of risk to reservoir storage. In addition, the seven-state criteria were developed using a 70R Strategy, which we believe is a more appropriate representation of the Colorado River reservoir operating strategy for the past fifteen years. The seven-state criteria were also developed using the Upper Colorado River Basin depletion schedule adopted by the Upper Colorado River Commission in December 1999, which is more up-to-date than the depletion schedule used in the DEIS. While these differences resulted in modifications and improvements to the six-state proposal discussed in the DEIS, the operation and impacts of the seven-state criteria are still within the range of alternatives and impacts analyzed in the DEIS.

Colorado worked extensively on the development of the DEIS supplemental information and is convinced that the seven-state proposal is the best alternative. We oppose the selection of any interim surplus criteria alternative that departs significantly from the seven-state proposal. Thank you for considering our comments on this very important matter.

Sincerely,

Greg E. Walcher,
Executive Director

cc:
Colorado Water Conservation Board Members
Upper Colorado River Commission Members
Colorado River Advisory Committee Members
Colorado Wildlife Commission Members

5: Comment noted.

6: The preferred alternative in this FEIS is derived from the Seven States proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

NEW MEXICO INTERSTATE STREAM COMMISSION

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SEP 11 2000

September 8, 2000

VIA TELEFAX AND FIRST-CLASS MAIL

Jayne Harkins
Bureau of Reclamation, BC00-4600
Post Office Box 61470
Boulder City, Nevada 89006-1470

Dear Ms. Harkins:

This letter is to provide comments of this office on the Draft Environmental Impact Statement (DEIS) issued by the Bureau of Reclamation on the proposed adoption of specific criteria under which surplus water conditions may be determined in the Lower Colorado River during the next 15 years. These comments include the information provided Reclamation from the Seven Colorado River Basin States included in the Federal Register/Vol. 65, No. 153, August 8, 2000.

1 Page 1-11 DEIS. Paragraph 1.3.2.2 states, that the Colorado River Compact apportioned to each basin, (Upper and Lower Basins), the exclusive beneficial consumptive use of 7.5 million acre-feet (maf) of water a year. No mention is made of the apportionment of an additional 1.0 maf to the Lower Basin as provided in Article III(b) of the Compact. The final EIS should include the Article III(b) apportionment.

2 Page 1-11, Paragraph 1.3.2.2.1. The paragraph states that the Upper Colorado Basin Compact divided the Upper Basin's 7.5 maf apportionment between the signatory states and lists the amount to Arizona and the percentage to each of the Upper Division States, which is not an accurate statement. The Upper Basin Compact apportioned among the four Upper Division States those percentages listed in Paragraph 1.3.2.2.1 of the total quantity of consumptive use apportioned to and available for use each year by the upper basin under the Colorado River Compact and remaining after deduction of the use, not to exceed 50,000 acre-feet per annum, made in Arizona.

3 Page 1-12, Paragraph 1.3.2.2.2. The paragraph lists apportionments to the Lower Division states totaling 7.5 maf, but does not mention that the listed apportionment, as confirmed by the U.S. Supreme Court Decree in Arizona v. California, is for only the mainstream water available for release by the United States. The final EIS should explain carefully the apportionment.

1: Paragraph 1.3.2.2 has been revised to include language describing the Lower Basin's right to increase its consumptive use by 1 maf.

2: Per your comment, paragraph 1.3.2.2.1 has been modified.

3: Per your comment, the first sentence in the first paragraph of paragraph 1.3.2.2.2 has been modified.

Ms. Jayne Harkins
September 8, 2000
Page 2

4 This office recommends that the Interim Surplus Guidelines-Working Draft provided to the Bureau of Reclamation by the Seven Colorado River Basin states be adopted by the Bureau of Reclamation as specific criteria for determining surplus, normal and shortage conditions for a 15 year interim period ending in 2016 and for determination of 602(a) storage in Lake Powell during the interim period.

We appreciate the opportunity to provide comment on the DEIS.

Sincerely,

Thomas C. Turney, P.E.
Secretary

Philip B. Mutz
Upper Colorado River Commissioner

TCT:PBM:rav

\\colorado\Harkins2.f00

4: The preferred alternative in this FEIS is the Basin States Alternative which was derived from the draft Seven States Proposal. Reclamation was unable to structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

COLORADO RIVER COMMISSION
OF NEVADA

SEP 11 2000

September 8, 2000

B000/1600

Mr. Robert W. Johnson
Regional Director
Attn: Jayne Harkins (LC-4600)
Lower Colorado Region
U.S. Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Re: Draft Environmental Impact Statement, Colorado River Interim Surplus Criteria

Dear Mr. Johnson:

The Colorado River Commission of Nevada, in its capacity as the Nevada state agency entrusted with the State of Nevada's interest in the Colorado River under the Colorado River Compact of 1922, has reviewed the Draft Environmental Impact Statement, Colorado River Interim Surplus Criteria, July 2000 (DES 00-25), the four alternatives discussed therein, and the supplementary material proposing a Seven Colorado River Basin States Alternative published on August 8, 2000 at 65 Federal Register 48531-48538. We endorse the comprehensive analysis contained within the Draft EIS, but recommend that the Seven Colorado River Basin States Alternative be adopted as the preferred alternative.

1 The Seven Basin States Alternative represents a solution to water management within the Lower Colorado River basin derived from the cooperative efforts of water users within the affected States, working collaboratively with the Bureau of Reclamation. It is the result of significant commitments on the part of Californians to diminish California reliance on the Colorado River and the forbearance of other Colorado River states to permit California to reach its more limited consumption objectives within a reasonable period. It contains quantitative means by which to determine whether surpluses exist, reducing subjectivity to some extent, but maintains the current process utilized annually in development of the Annual Operating Plan. We recognize that any interim surplus criteria may have some impact on power resources. We are ready to work with the BOR to minimize and mitigate potential impacts on power generation should they occur.

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1: The preferred alternative in this FEIS is derived form the Seven States proposal. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures.

cont'd

We recommend that the Seven Basin States Alternative be incorporated within the Final Environmental Impact Statement as the preferred alternative and that its details be analyzed pursuant to the same comparative analytical method exercised in the Draft Impact Statement with respect to the four alternatives presented therein.

Sincerely,

George M. Caan
Executive Director

Distribution
Colorado River Basin States Representatives (see attached list)

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COLORADO RIVER COMMISSION
OF NEVADA

SEP 11 2000

September 8, 2000

Mr. Robert W. Johnson
Regional Director
Attn: Jayne Harkins (LC-4600)
Lower Colorado Region
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Re: Draft Environmental Impact Statement, Colorado River Interim Surplus Criteria

Dear Mr. Johnson:

The Colorado River Commission of Nevada has received two comment letters in its capacity as designee of the Nevada Department of Administration's environmental document review Clearinghouse (Nevada SAI # E2001-005). Those two comment letters, from the Nevada Department of Transportation and the State Historic Preservation Officer, are attached.

Sincerely,

James H. Davenport
Chief, Water Division

Attachments

cc: Heather Elliott, Nevada State Clearinghouse

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INTER OFFICE

MEMO

RECEIVED
COLORADO RIVER COMMISSION

To: James Davenport, Colorado River Commission
From: Rebecca Lynn Palmer, Archaeologist
Subject: Colorado River Interim Surplus Criteria DEIS
Nevada SAI #E2001-005
Date: August 30, 2000

The Nevada State Historic Preservation Office (SHPO) has reviewed the subject document and has the following comments:

1. The SHPO concurs with the Bureau of Reclamation's determination that the "No action and each of the action alternatives could result in changes in the surface elevation of Lake Powell and Lake Mead and changes in release patterns and flow of the Colorado River below Hoover Dam." The SHPO also agrees that " These changes could result in changes in erosional and /or depositional processes that could affect historic properties, were such properties present" (3.13.4) As a result, the SHPO does not agree with the Bureau of Reclamation's determination that the undertaking has no potential to affect historic properties (3.13.2). By the agency's own definition, this undertaking does have the potential to affect historic properties. The probability that significant historic properties would or would not be present in the area of potential effects is not germane to this determination. 1

2. By making a determination that this undertaking does not have the potential to affect historic properties, regardless of the agency's own assertion to the contrary, the Bureau of Reclamation has precluded this agency, the public, affected Indian Tribes, and local governments from commenting on the effect of this undertaking. 2

3. The Bureau of Reclamation has emphasized the significance of archaeological and architectural resources to the exclusion of resources that could be of religious or cultural significance but contain no archaeological or architectural materials. The SHPO recommends that this document take the potential for Traditional Cultural Properties into consideration before preparing a final EIS. 3

4. The SHPO recommends that the Bureau of Reclamation obtain Advisory Council comment on the effect of this undertaking. 4

1: Thank you for your comments and for bringing to our attention your concerns regarding Reclamation's ongoing operation of the Colorado River. Per your request, the matter of effects to historic properties resulting from the development of Interim Surplus Criteria (ISC) has been forwarded to the Advisory Council on Historic Preservation (Council). However, because development and implementation of ISC falls within the range of ongoing operations and because the reservoirs will continue to be operated within historic operational parameters under the baseline conditions and action alternatives, Reclamation believes that the issues you raise are better addressed under Section 110, rather than Section 106, of the National Historic Preservation Act. Reclamation is aware of its responsibilities under Section 110 for managing historic properties on lands under its jurisdiction and will commit to consulting with you, the Council, tribes, and other interested parties within that framework.

2: Your office, the public, affected Indian tribes and local governments were provided an opportunity to identify concerns for the effects of the proposal for interim surplus criteria as part of scoping and individual meetings with interested publics and the Ten Tribes, CAP Tribes, and Colorado River Tribes. Distribution of the DEIS and public hearings were another means of providing opportunity to comment on our assessment of the effects of this undertaking on cultural resources. Reclamation is also consulting with potentially affected tribes on a government-to-government basis to understand and address their concerns. Reclamation will stand by its determination of effect of this action on historic properties and will refer our disagreement to the Advisory Council for further comment and consultation.

3: Resources of religious or cultural significance are Traditional Cultural Properties included in our definition of historic properties in Chapter 3.13.1.

4: Reclamation has referred the SHPO and Reclamation's disagreement to the Council for comment and further consultation.

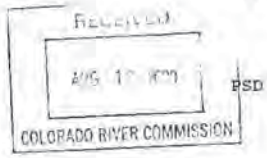
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

KENNY C. GUINN
Governor

August 3, 2000

TOM STEPHENS, P.E., Director

In Reply Refer to:



PSD 7.01

JAMES DAVENPORT
555 E WASHINGTON AVE
STE 3100
LAS VEGAS NV 89101

Dear Mr. Davenport:

The Nevada Department of Transportation has reviewed the project titled: DEIS for the Colorado River Interim Surplus Criteria, SAI# E 2001-005.

5 | Based on the information submitted there are no conflicts with Nevada Department of Transportation projects, plans or policies.

Thank you for the opportunity to review this project.

Sincerely,

Thomas J. Rumpel, P.E.
Assistant Director, Planning

TJR:TM:nc

cc: Heather Elliott, Nevada State Clearinghouse

5: Comment noted.

State of New Mexico
ENVIRONMENT DEPARTMENT
Office of the Secretary
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-2855
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GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY
AU 21 00

PAUL R. RITZMA
DEPUTY SECRETARY

BC00/600
BC00 4600

August 16, 2000

Regional Director
Lower Colorado Region
Attn.: Jayne Harkins (LC-4600)
Bureau of Reclamation
P.O. Box 61470
Boulder City
Nevada 89006-1470

Dear Ms. Harkins:

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE COLORADO RIVER INTERIM SURPLUS CRITERIA

This transmits New Mexico Environment Department (NMED) comments concerning the above referenced Draft Environmental Impact Statement (DEIS).

The DEIS describes alternatives for managing water stored in Lakes Mead and Powell. The alternatives are criteria for determining whether a surplus of water is stored in either of the reservoirs. Identification of a surplus may trigger a release, and the timing and nature of releases may influence surface water resources including aquatic life downstream of Glen Canyon Dam.

1 The NMED concurs with the Bureau of Reclamation that it is appropriate that, because operation of upper basin reservoirs (upstream of Lake Powell) is independent of Lake Powell, the "northern [upstream] limit of the potentially affected area under consideration in this DEIS is the upper reaches of Lake Powell" (DEIS, p. 3.2-1). The affected area is therefore beyond the jurisdiction of the NMED.

We appreciate the opportunity to comment on this document. Please let us know if you have any questions on the above.

Sincerely,

Peter Maggiore

PETER MAGGIORE
SECRETARY

NMED File No. 1382ER

1: Comment noted.

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RESOURCES

Michael O. Leavitt, Governor
Kathleen Clarke, Executive Director
D. Larry Anderson, Division Director

1594 West North Temple, Suite 310
PO Box 146201
Salt Lake City, UT 84114-6201
801-538-7230
801-538-7279 (Fax)

SEP 11 P.

BCOO/PGCC
4600

September 6, 2000

Ms. Jayne Harkins
Attention BCOO-4600
P.O. Box 61470
Boulder City, Nevada 89006-1470

Ms. Harkins:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) and supplemental information on the "*Colorado River Interim Surplus Criteria*". This important issue is of vital concern to Utah and all of the Colorado River Basin States.

1 While Utah recognizes the Lower Colorado River Basin's (in particular California's) demand for water exceeds their Compact apportionment, we have long been concerned that little was being done in California to manage its demand for Colorado River water. It is with hope that we see the development of Interim Surplus Criteria as a way to provide California and the Lower Basin an opportunity to put in place demand management constraints that will allow the Lower Basin to live within its compact apportionment, while providing California with a higher degree of certainty of keeping the Metropolitan Water District aqueduct full for the next 15 years. All of the Basin States and the Department of Interior (DOI) are to be congratulated for their earnest efforts in cooperating on this issue and attempting to develop an acceptable solution.

As in many issues dealing with the Colorado River, technical answers are far easier to obtain than acceptable solutions. In dealing with interstate and federal/state issues on the Colorado River, political compromise and consensus is, along with technical knowledge, the only way to obtain a workable solution. With this in mind, I would like to address a disconcerting premise in the No Action/Baseline alternative of the DEIS.

2 The DEIS states "*In order to follow the Council on Environmental Quality (CEQ) guidelines calling for No Action alternative for use as a "baseline" against which to compare project alternatives, the Bureau of Reclamation selected a specific operating strategy that represents possible future operating conditions in the absence of interim surplus criteria . . .*" (Paragraph 3 of page S4 of the DEIS). The No Action/Baseline strategy wrongly selected by the Department of Interior was 75R. Without getting into the technical merits of a 75R versus a more conservative 70R strategy, I would point out that prior to the start of the Interim Surplus Criteria process, the 70R strategy was the political compromise accepted by the Seven Colorado River Basin States as part of the Annual Operating Plan (AOP) development process. For the DOI to

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1: Comment noted.

2: The 70R strategy is used for the baseline in this FEIS.

cont'd

choose any other baseline than 70R is unacceptable and raises questions of trust and hidden agendas. We understand this baseline was an error and will be corrected in the final document. Utah requests the No Action/Baseline alternative be rewritten using a 70R strategy to reflect the historic process that has been use by the Department of Interior and the Seven Colorado River Basin States in developing the Annual Operating Plan each year.

3

In the spirit of cooperation and consensus, the Seven Basin States have recently developed and presented the "Seven Basin States Interim Surplus Guidelines" (Guidelines), as requested by the Secretary of Interior in his keynote address at the December 1999 Colorado River Water Users Workshop in Las Vegas. The Secretary indicated he would use the states Guidelines to administer the Lower Colorado River Basin water supply during the next 15 years if the states could develop a consensus position. The Guidelines have been painstakingly developed and are the result of much effort and compromise of all the parties. The Guidelines have been published in the Federal Register (August 8, 2000, page 48531). These Guidelines include: 1) protection of Upper Colorado River Basin Water Users, 2) protection of water levels in Lake Powell, 3) and enforceability of California's commitment to manage demand to 4.4 million acre-feet per year of Colorado River Water. These three items are critical for Utah's and the other basin states support of the new Interim Surplus Criteria.

Utah feels the Guidelines fit within the range of the alternatives evaluated as part of the DEIS. It is Utah's full expectation the Guidelines will be adopted by the Secretary of Interior in his Record of Decision. Given how hard it is to craft a compromise and develop support for these issues on the Colorado River, the "Seven Basin States Interim Surplus Guidelines" must not be ignored; and the Secretary of Interior needs to affirm his promise to implement the Guidelines developed by the states as the preferred alternative in the Final EIS.

Thank you,

D. Larry Anderson

D. Larry Anderson, P.E.
Director

cc: Governor Michael O. Leavitt
Upper Colorado River Commission
Seven Basin States

3: The preferred alternative in this FEIS is the Basin States Alternative which was derived from the draft Seven States Proposal. Reclamation was unable to structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures. Reclamation's detailed description of the Basin States Alternative is in Attachment I.

State Of Wyoming
Office of Federal Land Policy

JIM GERINGER
GOVERNOR

ART REESE
DIRECTOR

SEP 13 2000

September 8, 2000

Mr. Robert Johnson, Regional Director
Lower Colorado Region
c/o Ms. Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

BC001000
4600

Dear Mr. Johnson:

On behalf of the State of Wyoming, this Office has reviewed the Draft Environmenal Impact Statement for the Colorado River Interim Surplus Criteria. We also provided the information to all affected State agencies for their review, in accordance with State Clearinghouse procedures. Under separate cover I believe you received a letter from the Wyoming State Engineer's Office. I have enclosed a copy of that letter for your convenience.

State agency comments are specific to their respective agency missions. While the State defers to their respective technical expertise in developing a unified State position, the responsibility to ultimately articulate the official State policies and positions lies with the Governor or the Office of Federal Land Policy. However, having said that, in this particular case, we defer to the very able technical expertise of the State Engineer's Office. They have been active in the process since its inception and will continue to be involved.

This Office will require two copies of future information and documents regarding this project for continued distribution and review.

The State of Wyoming appreciates the opportunity to comment.

Sincerely,

Julie L. Hamilton
Assistant Director

Enclosure (1)

Herschler Building 1W ◆ 122 W. 25th Street ◆ Cheyenne, Wyoming 82002-0060
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State Engineer's Office

JIM GERINGER
GOVERNOR

HERSCHLER BUILDING, 4-E CHEYENNE, WYOMING 82002
(307) 777-7354 FAX (307) 777-5451
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RICHARD G. STOCKDALE
ACTING STATE ENGINEER

August 28, 2000

Mr. Robert Johnson
Regional Director, Lower Colorado Region
c/o Ms. Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470

Re: Transmittal of Comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement, DES 00-25, filed July 7, 2000

Dear Mr. Johnson:

The Wyoming State Engineer's Office has reviewed the subject draft Environmental Impact Statement (DEIS) and supplemental information provided by the Bureau of Reclamation. As you are aware, the State Engineer's Office is quite supportive of the development of interim surplus criteria and has been an active participant in the deliberations and dialogue concerning this important matter. These comments are subject to this agency's statutory mission which includes the preservation of Wyoming's water allocations to safeguard the State's current and future water supplies. In that regard, our comments, along with those of other agencies who review and comment on the subject document are meant to assist in defining the official State position. Accordingly, the following comments defer to and are subordinate to the official State Position which will be forthcoming by the close of the public comment period.

In our letter of June 30, 1999, this office responded to the May 18 and May 29, 1999 Federal Register notices advising of Reclamation's consideration of development of interim operating criteria. In that letter, we noted our support for the development of both surplus and shortage criteria and we noted our prior recommendation to the Secretary that the development of surplus and shortage criteria for the interim period be incorporated into the ongoing and well established AOP development process. Our letter expressed concerns about the scope, commitment of resources, usefulness and time schedule associated with preparation of a National Environmental Policy Act (NEPA) document for Reclamation's development effort. The subject DEIS does not contain a preferred alternative and has been delayed far beyond the original schedule publicized during the scoping meetings (that schedule specified "agency/public review and comment – January through March 2000"). The DEIS unfortunately does not address

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Wyoming State Engineer's Comments on the Colo. River Interim Surplus Criteria Draft EIS
August 28, 2000
Page 2

shortage criteria with the exception that shortage "triggers" are embodied in certain of the surplus alternatives. Clear and concise explanations, beyond generalized statements, of the impacts and the relative differences on affected resources of the alternative analyzed are difficult to find in the DEIS.

While we feel that the document has a number of shortcomings that result from the wide-sweeping approach taken, the impact of the various alternatives and no preferred alternative being set forth, we are hopeful that the supplementary information published in the Federal Register on August 8th will be most helpful in crystallizing a preferred alternative and moving this important effort forward. The Wyoming State Engineer's Office continues to be supportive of implementing interim surplus operating criteria and urge Reclamation to expeditiously prepare the Final EIS and issue its record of decision as soon as practical.

The Wyoming State Engineer's Office offers the following specific comments on this draft environmental impact statement.

1 Page S-3, 3rd, 4th and 11th lines of "The California Colorado River Water Use Plan" - references to the California Colorado River Water Use Plan as the "California 4.4 Plan" or the "4.4 Plan" should be to the "California Colorado River Water Use Plan which was formerly known as the California 4.4 Plan."

2 Page S-6, Heading S.2.6, 6th line - The word "may" needs to be changed to "will" in this line. The sentence which begins on the previous line therefore would read: "The continuation of the interim surplus criteria through 2015 will be contingent upon satisfactory progress.

3 cont'd Page S-8, S.3.4, 2nd paragraph - This paragraph states: "Mexico would receive its Treaty apportionment of Colorado River water under baseline conditions and all alternatives. The average probability of Mexico receiving its surplus entitlement of 200,000 af during any given year of the interim surplus criteria period is highest under the Flood Control Alternative (approximately 37 percent). The lowest average probability occurs under the shortage protection alternative (approximately 30 percent). The average probabilities of surplus deliveries to Mexico during any given year of the interim surplus criteria period under the baseline conditions and the Six States and California alternatives are 34, 32 and 30 percent, respectively." We note that these summary statements regarding the availability of surplus water for Mexico (the additional 200,000 af when there exists a surplus of waters of the Colorado River in excess of the amount necessary to satisfy uses in the United States) appear to be inconsistent with the statement found near the end of Section 1.1.4 on page 1-4 which reads: "This proposed action is not intended to identify conditions when Mexico may schedule this additional 0.2 maf (emphasis supplied). Reclamation is currently engaged in discussions with Mexico through the IBWC on the effects of this action."

Further, these summary statements relating the probability of occurrence of surplus water for Mexico seem to imply that the DEIS and its underlying hydrological simulation studies have

1: References to California's draft Colorado River Water Use Plan (CA Plan) have been corrected to distinguish it from their previous draft "4.4 Plan" where appropriate in the FEIS.

2: The Secretary's decision to continue interim surplus criteria within the 15-year interim period would be based on a number of factors which may include satisfactory progress towards meeting the goals of California's Colorado River Water Use Plan. Please refer to the response to Comment 33-3.

3: See response to Comment No. 11-13, regarding additional water deliveries to Mexico. This FEIS does not identify conditions for such deliveries.

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prejudged that there would be Colorado River surplus waters in excess of the amount necessary to satisfy uses in the United States. The intent of the interim surplus operating criteria was set forth in the May 18, 1999 Federal Register notice (64 FR 27008 et seq.) as being:

> "Summary: The Department of the Interior, Bureau of Reclamation ("Reclamation") is considering development of specific criteria that will identify those circumstances under which the Secretary of the Interior ("Secretary") may make Colorado River water available for delivery to the States of Arizona, California and Nevada (Lower Division States or Lower Basin) in excess of the 7,500,000 acre-foot Lower Basin apportionment."

3 cont'd

In the "Supplementary Information" section on page 27009, the Notice stated:

> "In recent years, demand for Colorado River water in Arizona, California, and Nevada has exceeded the Lower Basin's 7,500,000 acre- foot basic apportionment. As a result, criteria for determining the availability of surplus has become a matter of increased importance. Under these circumstances, the Secretary believes that it may be prudent to develop specific criteria that will guide the Secretary's annual decision regarding the quantity of Colorado River water available for delivery to the Lower Basin States.

The "Summary" section of the May 28, 1999 *Federal Register* notice regarding the public meetings on the development of Surplus Criteria for Management of the Colorado River contained the same wording cited above. We suggest, based on the above, that Reclamation should recognize the intent expressed in the *Federal Register* statements rather than the wording found on page 1-4 and therefore revise by excluding the discussion of the additional water deliveries to Mexico in the Final Environmental Impact Statement for this proposed action.

4 Page 1-11, 3rd paragraph, 1st line - "Section VII" should be changed to "Article VII" in order to be consistent with the wording in the remainder of this section and with the wording of the Colorado River Compact.

4: The suggested edit was included in the FEIS.

5 cont'd below Page 1-12, Section 1.3.2.2.2, middle of the paragraph - Herein a sentence is found which reads: "The apportionments to the Lower Basin were established by the BCPA and confirmed by the Decree." This statement is technically incorrect. Milton N. Nathanson, in *Updating the Hoover Dam Documents*, (United States Department of the Interior, Bureau of Reclamation, United States Government Printing Office, Denver, Colorado, 1978) wrote on pages 8 and 9 of this book prepared by Reclamation that:

> "Section 4(a) of the Boulder Canyon Project Act authorized the Lower Basin States of Arizona, California and Nevada to enter into an agreement providing that of the 7.5 maf/yr annually apportioned to the Lower Basin by Article III(a) of the Compact there shall be apportioned to Nevada, 300,000 acre-feet annually ...

5: Comment noted.

Wyoming State Engineer's Comments on the Colo. River Interim Surplus Criteria Draft EIS
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> The three State apportionment was never agreed upon by the Lower Division States despite negotiations in 1929 and 1930. However, the Supreme Court Opinion of June 3, 1963, in *Arizona v. California* (373 U.S. 546) concluded that Congress had made such an apportionment by authorizing the Secretary to accomplish this division. This was done by the Secretary's contracts for the delivery of water in the Lower Basin States and by providing (Section 5) that no person could have the use of Colorado River water without a contract with the Secretary for permanent service."

6 Page 1-14, Section 1.3.3, 3rd line - The text states that the LROC "address the operation of the Colorado River reservoirs ..." Reference to the second sentence of the LROC (Attachment A) will clarify that "They are to control the coordinated long-range operation of the storage reservoirs in the Colorado River Basin ..." Accordingly, the word "address" should be changed to "control" or "govern."

7 Page 1-15, second line - Similar to the comment offered immediately above, the word "addressed" is inappropriately used in discussing the LROC provisions regarding equalization of storage between Lakes Powell and Mead. The LROC use the word "shall" and hence the word "addressed" should be changed to "prescribed" or "mandated."

8 Page 1-16, Section 1.3.5, first line - We suggest inserting the word "federal" after "reservoirs" and before "reservoirs" in order to clarify this sentence. The aggregate storage capacity of all reservoirs in the Colorado River system would be much greater than this sentence indicates.

9 Page 1-20, Section 1.3.6, last sentence - Please clarify the sentence which reads, "Reclamation has the responsibility to maintain the floodway." What does "maintain" mean in the context of this sentence and this section of the DEIS?

10 Page 1-21, Section 1.4.1 - We suggest that references herein to the California 4.4 Plan or the 4.4 Plan make clear that the California Colorado River Water Use Plan was formerly referred to as the 4.4 Plan and due to the inaccuracy of this term it is no longer used.

11 cont'd below Page 1-22, Section 1.4.1, 2nd full paragraph, 6th line - The choice of the word "may" in the sentence stating: "Therefore, regardless of which alternative is ultimately selected, failure of California to carry out the 4.4. Plan (sic) may result in termination or suspended application of the 15-year interim surplus criteria and reversion to the current system of surplus determinations that are made through the AOP process (emphasis supplied)." The word "may" must be changed to "will." In the following sentence, which reads: "Therefore, the Secretary may condition the continuation of interim surplus criteria for the entire period through 2015 on a showing of satisfactory progress in implementing the 4.4 Plan (sic) (emphasis supplied)." In this sentence, the word "may" must be changed to "will." A fundamental tenet of the willingness of Wyoming and other Colorado River Basin states to concur with the interim surplus operating criteria is enforcement of timely implementation of the California Colorado River Water Use Plan. This

6: The suggested edit was included in the FEIS.

7: The word "addressed" was changed to "included", since the requirement is included in the LROC.

8: Comment noted. The wording was not modified in the FEIS.

9: The Secretary of the Interior and Reclamation has the responsibility to conduct reviews of the floodway mapping at 5-year intervals, annually inspect the floodway to determine if any encroachment is occurring, and perform other activities. The activities for Reclamation and other federal entities as recommended to Congress are reported in the "Final Report of the Secretary of the Interior to the Congress of the United States on the Colorado River Floodway Protection Act", dated October 1992.

10: Comment noted. The term 4.4 Plan is no longer used to refer to California's current plan.

11: Comment noted. The term 4.4 Plan is no longer used to refer to California's current plan.

Wyoming State Engineer's Comments on the Colo. River Interim Surplus Criteria Draft EIS
August 28, 2000
Page 5

11 cont'd | wording, repeated in this document several places, without clarification is troubling and is inconsistent with Secretary Babbitt's pronouncements, negotiations among the seven Colorado River Basin States and understandings reached between the Department of Interior and the seven Colorado River Basin States over a period of numerous years.

12 | Page 2-1, Section 2.2.1.1 - The description that is found in this section of the spill avoidance or "R" strategy provides a well-worded and concise description of the strategy.

12: Comment noted.

13 | Page 2-3, Section 2.2.3, 1st paragraph, 5th line - We suggest that the word "under" that appears after "criteria" be changed to "within."

13: The change was made.

14 | Page 2-5, Section 2.3, 2nd paragraph - This paragraph states: "As noted above, the 75R operating strategy is not presented as an alternative for adoption. If an interim surplus criteria alternative is not implemented, it is presumed that the Secretary would determine surplus conditions using the same dynamic considerations currently used in the Secretary's annual determination (in the AOP), as discussed previously." While this is certainly the easiest and cleanest assumption that could be made for purposes of this DEIS, it does not seem to this office that this scenario is very likely. This assumption, as embodied in the above cited statement, ignores the fact that the Colorado River Management Work Group has discussed and has initiated several faltering attempts to develop more specific surplus and shortage operating criteria during the course of its work and discussions. The need for more specific criteria has been on the table for a number of years at this point in time. We would suggest that this wording be revised to indicate the difficulty in speculating what would be developed as the more specific criteria to be used for making surplus determinations and, therefore, on that basis, it is presumed that the Secretary would determine surplus conditions using the same dynamic considerations currently used.

14: Comment noted.

15 | Page 2-9, Section 2.3.3.2, 1st paragraph - As acknowledged later in the text (page 2-10) the Six States alternative proposed that Tier 1 would be established by the "70R Line," NOT the "75R Line" as stated in the text in the 3rd line from the bottom of the page.

15: See response to Comment 37-8.

16 | Page 2-10, Section 2.3.3.2.1, 3rd line - Same comment as immediately above, i.e., the Six States Alternative Tier 1 was based on the "70R line," NOT the "75R line" as stated here in the text.

16: See response to Comment 37-8.

17 | Page 2-10, Section 2.3.3.2.1, 2nd paragraph - The text correctly states in the first sentence of this paragraph that: "It should be noted that the original Six State Plan uses the 70R strategy as the Tier 1 trigger" The second sentence states: "However, for modeling consistency with the baseline, the 75R strategy was used in this analysis for the Six States Alternative Tier 1 trigger." We request clarification about why it is necessary to have "modeling consistency" with the baseline. What does "modeling consistency" mean as used in this sentence. Certainly other questions could be asked about consistency regarding what was done with the other alternatives. The 70R and 75R strategies have an assumed annual runoff that varies by 800,000 acre-feet.

17: Comment noted. See response to Comment 37-8.

Wyoming State Engineer's Comments on the Colo. River Interim Surplus Criteria Draft EIS
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Page 6

18 | Page 3.3-3, Section 3.3.1.2, 1st line – We suggest that the words "and pumping from Lake Mead" be added after "annual releases" and before "of at least 7.5 maf" in this first sentence of this paragraph. Without this clarification, the sentence is technically incorrect.

18: The first sentence of the first paragraph in Section 3.3.1.2 has been changed to read as follows - Hoover Dam is managed to provide at least 7.5 maf annually for consumptive use by the Lower Division states plus the United States' obligation to Mexico.

19 | Page 4-3, Section 4.4, 1st full paragraph, 7th line - As commented on above, we object to the use of the word "may" and feel that it must be changed to "will" in the sentence beginning in the 5th line of this paragraph. The seven state negotiations over the past several years have been based on the principle that if the State of California fails to meet its water conservation and management goals throughout the stipulated term of implementation of the criteria, the Secretary will terminate the interim surplus criteria and operations will revert to the present manner of determining whether a surplus water supply condition exists.

19: The Secretary's decision to continue interim surplus criteria within the 15-year interim period would be based on a number of factors which may include satisfactory progress towards meeting the goals of the California Colorado River Water Use Plan. See Attachment I.

20 | Page 5-1, Section 5.2, 1st paragraph - Change the word "on" to "in" in front of "Colorado River operations."

20: Comment noted.

21 | Page REF-22, middle of the page - There is a problem with a missing line space between the citation for "Sogge, et al." and "Thwaites." There is an extra line space that should be removed between "Unitt" and "USBR."

21: Comment noted. Change made in FEIS.

22 | Page LOP-3 - Is it Barbara "Ralston" or Barbara "Raulston" in the middle of this page?

22: Correction has been made. "Raulston" is the correct spelling.

23 | Attachment A cover page - the use of the word "guidelines" in the 3rd line of the paragraph on this cover page inappropriately understates the import and effect of the LRCC. We would suggest a wording revision that eliminates use of this word.

23: Comment noted. The change has been made.

24 | Attachment A, page 2, last line "releases" should be "released."

24: The change was made.

25 | Attachment I, Detailed Modeling Documentation - We are disappointed to note that documentation of the modeling was deferred to the FEIS and that the reader is merely referred to Section 3.3.3.3 by the text on the cover-page of this Attachment. We presume that there will be sufficient opportunities to learn more about the details at the August 15, 2000 modeling meeting that is being held in Las Vegas, Nevada. Perhaps Reclamation will hear from interested reviewers and the Basin States at that meeting the sorts of descriptive information that will be most useful to include in Attachment I when it is prepared for the FEIS.

25: Attachment I was prepared following the publication of the DEIS. Copies of Attachment I were made available to the public at the technical presentation on August 15, 2000, at all the public hearings, and as requested by mail. The Detailed Modeling Documentation is Attachment J to the FEIS.

26 | Attachment P, entitled "Public Scoping Process," page 1, next to last paragraph - The first sentence of this paragraph states: "Two notices were published in the Federal Register regarding the proposed reallocation of Colorado River water." We believe that the choice of the words "proposed reallocation of Colorado River water" is both unfortunate and inaccurate. The adoption of more specific surplus criteria that will be applied during the interim period to make surplus determinations is not properly characterized, in our view, as a reallocation of Colorado River water. We request that this wording be changed to more specifically state the effect of the proposed action.

26: The sentence has been corrected with wording that better matches the Federal Register Notice: "development of surplus criteria for management of the Colorado River."

Wyoming State Engineer's Comments on the Colo. River Interim Surplus Criteria Draft EIS
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27 | Attachment P, page 2, Table 1 - The reference to "Las Vegas, CA" in the second column should be to "Las Vegas, NV."

28 | Attachment P, pages 5-10, which encompass "Table 2" - this representation of the comments that were received during the scoping meetings and in response to the request for comments is exceedingly weak in our evaluation. The great lack of detail and extreme generalization associated with this format for describing and characterizing the comments that were received during the scoping process makes the presentation of this information of very little value. This section also fails to describe how the comments were used in any manner in the preparation of the DEIS, which is disappointing to our agency, who participated in one of the public meetings and provided a comment letter.

Thank you for the opportunity to submit these comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement. Should you have any questions, please don't hesitate to contact me at (307) 777-6151 or via e-mail at jshiel@state.wy.us. We look forward to expeditious preparation of the final environmental impact statement and the execution of the record of decision that will allow the implementation of interim surplus criteria for making surplus water determinations in the Secretary's Colorado River Annual Operating Plan during the interim period.

With best regards,

John W. Shields
Interstate Streams Engineer

cc: Seven Colorado River Basin States Representatives
Wayne Cook, Upper Colorado River Commission

27: This change has been made in the document.

28: Table 2 is intended as a summary of the comments received. The specialists working on this EIS were provided with complete sets of the comment letters and with transcripts of the scoping meetings.

TRIBES

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September 8, 2000

Via Facsimile 702/293-8042
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Regional Director
c/o Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
P.O.Box 61470
Boulder City NV 89006-1470

RE: Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

Dear Ms. Harkins:

Thank-you for the briefing on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement on August 30, 2000, at the Morongo Indian Reservation. Unfortunately, this meeting was scheduled much too late in the planning and development process to have allowed the Tribe the meaningful opportunity to evaluate the impacts of this plan and to have had our concerns addressed in the draft report. For this reason, it is our position that the Bureau of Reclamation has failed in its duty to act responsibly to protect and maintain Indian Trust Assets in potentially impacted areas of this project plan. The Agua Caliente's off-Reservation interests and concerns have not and yet must be taken into account because of the project's potential to directly, indirectly, and cumulatively affect water quality and quantity on the Reservation. The Bureau of Reclamation has failed to demonstrate that it has taken every precaution and measure to insure the protection of the Agua Caliente Indian Reservation from adverse affects of this project in a shared and unadjudicated aquifer system. Furthermore, the Bureau of Reclamation has shamefully neglected to enter into to serious government-to-government consultations with all potentially affected Tribes in the Coachella Valley. The Bureau is in direct violation of official Federal Policy pursuant to the following authorities:

1. Executive Order No. 13084: consultation and Coordination with Indian Tribal Governments (May 14, 1998), and

1

1a

1: Metropolitan Water District of Southern California (MWD) and the Coachella Valley Water District (CVWD) have and are currently storing portions of their basic and surplus apportionments of Colorado River water for intrastate purposes but the U.S. has jurisdiction over reserved Tribal water. Intrastate storage (e.g. groundwater storage) activities/facilities are not within Reclamation's jurisdiction, and thus does not permit nor follow the water for environmental compliance purposes once delivered to a water user's point of diversion. The federal government does not have jurisdiction over groundwater aquifers, recharge sites or other off-stream storage sites within the states. Ongoing or new groundwater storage projects would be regulated by state and local regulations and compliance requirements under CEQA, California Water Control Board, and the California Department of Health Services. The Coachella Valley Water District's water management plan and the related state permitting process are probably where the Tribes will find the best available information. Reclamation has the authority to deliver water only to the diversion point along the mainstem Colorado River.

1a: Reclamation respectfully believes that appropriate consultation with Indian Tribal Governments occurred with respect to the development of Interim Surplus Criteria. A full listing of the consultations during the development of the Interim Surplus Criteria is found in Section 5.4.

1a cont'd

2. The President's Memorandum on Government-to-Government Relations with Native American Tribal Governments, 59 Fed. Reg. 22,951 (April 29, 1994)

2 In view of the above critical issues, and the Tribe's inherent sovereign authority and interest in managing its water resources on the Reservation, we have evaluated the proposed alternatives and Draft Environmental Impact Statement as, "insufficient and seriously flawed." We strongly urge the Bureau's consideration of effects to Tribal Trust Lands in the Coachella Valley Watershed particularly in regards to groundwater banking.

3 In the future, we expect to be kept fully appraised through formal consultation of the progress and redraft of this report and to receive three (3) copies of the Final Environmental Impact Statement. The Tribe is not simply a stakeholder or member of the public, but a sovereign owed a duty of trust and is entitled to full participation in the consultation process.

We appreciate your cooperation and look forward to hearing from you.

Very truly yours,

Richard M. Milanovich
Chairman, Tribal Council
AGUA CALIENTE BAND OF CAHUILLA INDIANS

C: Tom Davis, Planning Director
Michael Kellner, Natural Resource Manager

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2: Reclamation respectfully disagrees and does not believe that the DEIS is flawed. Further, see response to Comment 48-1, and 48-1a.

3: Comment noted. The mailing list has been changed to reflect the need of three copies.

HUALAPAI NATION
OFFICE OF THE CHAIRWOMAN

Louise Benson
Chairwoman

Carrie Injus
Vice Chairwoman

P.O. Box 179 • Peach Springs, Arizona 86434 • (520) 769-2216

September 8, 2000

VIA FACSIMILE No. (702) 293-8042

Regional Director
Lower Colorado Region
c/o Jayne Harkins
BC00-4600
Bureau of Reclamation
PO Box 61470
Boulder City, NV 89006-1470

Re: Colorado River Interim Surplus Criteria Draft Environmental Impact Statement ("DEIS")

Dear Ms. Harkins:

On behalf of the Hualapai Tribe, I submit for the record the enclosed comments on the Colorado River Interim Surplus Criteria DEIS. As explained in the comments, the Hualapai Tribe has serious concerns about the impacts of the proposed criteria on the Tribe's ability to utilize its Colorado River water rights, on its economic development, and on its cultural resources.

Because the impacts of the proposed criteria on the Hualapai Tribe would be significant and because the Bureau of Reclamation ("Reclamation") and the Department of Interior ("DOI") have a trust duty that requires consultation with the Hualapai Tribe and protection of our water rights and other resources, we urge Reclamation and DOI to:

1. Immediately commence quantification of our Colorado River water rights and complete quantification early in the implementation of the interim surplus criteria and prior to the first five year review of the interim surplus criteria;

2. Revise the DEIS to include analysis of the impacts on the Hualapai Tribe's water rights;

3. Revise the DEIS to include analysis of the socioeconomic impacts on the Hualapai Tribe;

4. Comply with the National Historic Preservation Act § 106 process for taking into account the proposed action's impacts on cultural resources of concern to the Hualapai Tribe;

5. Protect the integrity of and access to Hualapai sacred sites on federal lands;

6. Mitigate significant Hualapai socioeconomic, environmental justice and cultural resource impacts;

7. Rewrite the DEIS in plain language;

8. Recirculate the DEIS for public comment after making the revisions requested above; and

9. Complete all of the foregoing through government-to-government consultation with the Hualapai Tribe.

Please share these comments with Deputy Secretary David Hayes, Debbie Saint, and other appropriate persons at BOR and DOI to ensure that we are promptly contacted to schedule an initial consultation meeting in September 2000.

Sincerely,

Louise Benson

Louise Benson
Chairperson

cc (w/encl.): Deputy Secretary of Interior David Hayes
Debbie Saint, Bureau of Reclamation
Felicia Marcus, Regional Administrator, U.S. EPA Region 9
Clay Bravo, Director, Hualapai Department of Natural Resources
Annette Morgan, Program Manager, Hualapai Department of Natural Resources
Monza Honga, Director, Hualapai Department of Cultural Resources
Cameron Daines, President, Grand Canyon Resort Corporation
Susan G. Jordan, Nordhaus, Haltom, Taylor, Taradash & Bladh, LLP

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COMMENTS OF THE HUALAPAI TRIBE ON THE COLORADO RIVER INTERIM SURPLUS CRITERIA DRAFT ENVIRONMENTAL IMPACT STATEMENT ("DEIS")

September 8, 2000

Introduction

The Hualapai Tribe has serious concerns about the impacts of the proposed interim surplus criteria on the Tribe's ability to utilize its water rights, on its economic development, and on its natural and cultural resources. The DEIS ignores these impacts, in violation of the trust duty, the requirement under the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321, et seq., to consider the significant impacts of the proposed action, the cultural resources protection requirements of the National Historic Preservation Act ("NHPA"), 16 U.S.C. §§ 470, et seq., and the requirements of various Executive Orders concerning Native American Tribes and environmental justice populations.

In proposing the interim surplus criteria, the Department of the Interior ("DOI")[1] has not only failed to consider these impacts but also has failed to meet its trust duty to protect the Hualapai Tribe's trust resources. As the DOI is well aware, the Hualapai Tribe has unadjudicated aboriginal and federal reserved water rights in the Colorado River. These water rights are Indian Trust Assets entitled to protection by the DOI. The Hualapai Tribe has repeatedly requested consultation with the DOI on the quantification and protection of our water rights, to no avail.

In the past year, we have joined the Navajo Nation and the Havasupai Tribe in requesting a joint meeting with the DOI regarding water right issues of mutual concern to the

[1] As stated in the DEIS, the Secretary of the Interior is "acting through the U.S. Bureau of Reclamation (Reclamation)" in proposing the interim surplus criteria. DEIS at 1-1. The National Park Service ("NPS"), which like Reclamation is within the DOI, is a cooperating agency for the DEIS. Id. at 1-4. All references to DOI in these comments include the DOI, Reclamation and NPS.

tribes, including the proposed interim surplus criteria. Once again, we ask the DOI to honor its trust duty to protect our water rights by promptly quantifying our water rights in consultation with us. We understand that DOI intends to adopt interim surplus criteria by the end of this year, despite our objection to adoption of criteria prior to quantification of our water rights. Therefore, we demand that DOI immediately commence quantification of our water rights and complete quantification early in the implementation of the interim surplus criteria and prior to the first five year review of the interim surplus criteria. We also urge the DOI to take various other steps to address the violations of the trust duty, NEPA, NHPA and the Executive Orders discussed in these comments. These requests are summarized in the final section of these comments.

Table of Contents

Overview of the Hualapai Tribe and the Hualapai Reservation.

The Hualapai Tribe is a federally recognized Indian Tribe. **The Hualapai once inhabited seven million acres in and around the Grand Canyon and the Colorado River.** The Hualapai Indian Reservation was established in 1883 on a portion of the Tribe's ancestral lands. The main land base of the Reservation, located in northwestern Arizona, encompasses approximately one million acres of land and extends for 108 Colorado River miles, from about River Mile 165 to about River Mile 273

The Colorado River is central to Hualapai history, culture, sustenance and survival. The Hualapai traditionally cultivated along the Colorado River banks, in the side canyons and on the plateau. Hualapais also crossed the Colorado River at strategic locations in order to trade and visist with their relatives, the Pai Pais. Traditional ceremonial sites on the Colorado River have continued in use to the present day. **The Hualapai have engaged in ranching over vast areas of the Reservation since the early part of the 20th Century. The Hualapai, who are known as "the People of the Tall Pines," traditionally harvested timber. Timber harvesting is a significant component of the Reservation economic base today.**

The Hualapai Tribe's current economic development efforts focus on tourism. **The Tribe has designated about 9,000 acres in the northwest corner of the Reservation with unsurpassed views of the Grand Canyon and the Colorado River for tourism development. This area, known as Grand Canyon West, receives nearly 100,000 daytime visitors annually. In addition, Hualapai River Runners guides dozens of tourists on white water and float trips every day of the rafting season. These business ventures provide an important source of Tribal government revenues and Reservation employment.**

The Hualapai Tribe has an enrolled membership of about 2,200 persons. Approximately 1,800 persons reside on the Hualapai Reservation, including about 1,000 enrolled tribal members. Poverty and unemployment are epidemic on the Reservation. Over 56% of Indian residents were below the poverty level in the 1990 Census, and over 80% were below the U.S. Department of Housing and Urban Development's Very Low Income Standard in 1991. The Reservation unemployment rate is quite high: 56% according to 1995 BIA Labor Force data and up to 70% seasonally according to the Hualapai Tribe's most recent data.

The Hualapai Tribe Has Aboriginal and Federal Reserved Water Rights in the Colorado River.

There can be no question that the Hualapai Tribe has aboriginal water rights in the Colorado River. These rights arise from the Tribe's habitation and cultivation of the lands, and associated water uses, in and around the Grand Canyon since time immemorial. In addition to these aboriginal rights, the Hualapai Tribe possesses federal reserved water rights in accordance with the establishment of the Hualapai Reservation.

3

The Hualapai Tribe's water rights have not been quantified because the United States has failed to pursue quantification, notwithstanding the repeated requests of the Tribe and the federal government's trust duty to protect those rights. In the Arizona v. California adjudication, the United States purported to represent the Tribe yet failed to pursue quantification of the Tribe's water rights. Tribal water rights above Lake Mead – including the rights of the Hualapai Tribe, the Navajo Nation and the Havasupai Tribe – were not quantified in Arizona v. California. See 376 U.S. 340, 353 (1964). While the decree in that case did not quantify these tribal rights, it also did not affect any Indian aboriginal or federal reserved water rights above Lake Mead. See id.

The fact that the Hualapai Tribe's federal reserved water rights are not quantified and are not presently fully used by the Tribe does not change their status as federal reserved water rights. Indian federal reserved water rights need not have identified, immediate uses to justify a duty of protection by the United States government. See Winters v. United States, 207 U.S. 564 (1908). Pursuant to the "Winters Doctrine," Indian federal reserved water rights are property rights which are intended to meet the present and future needs of Indian tribes and which vest no later than the establishment of the reservation, regardless of whether those rights have been adjudicated or otherwise formally permitted. See Arizona v. California, 373 U.S. 546, 598-600 (1963). In addition, Indian federal reserved water rights do not depend upon beneficial use for their initial or continued existence. See, e.g., Cappaert v. United States, 426 U.S. 128, 143-145 (1976).

The DOI has a Trust Duty to the Hualapai Tribe to Protect the Tribe's Indian Trust Assets, and must Explicitly Address the Proposed Action's Impacts on the Tribe's Trust Assets and Fully Mitigate or Avoid Those Impacts.

The federal government in its dealings with Indian Tribes is charged with "moral obligations of the highest responsibility and trust" and should be "judged by the most exacting fiduciary standard." Seminole Nation v. United States, 316 U.S. 286, 296 (1942). The DOI has adopted policies and procedures to ensure that its actions comply with its trust responsibility. DOI policy requires DOI to protect trust resources and conduct government-to-government consultation with tribes:

> It is the policy of the Department of Interior to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal health and safety.

512 DM 2.2 (Dec. 1995). See also Secretarial Order 3215, April 28, 2000.

Reclamation's own Indian Trust Asset Policy states that the "trust responsibility requires that all Federal agencies, including Reclamation, take all actions reasonably necessary to protect trust assets." See Bureau of Reclamation, Indian Trust Asset Policy (Aug. 31, 1994)

4

in Protection of Indian Trust Resources (compilation on file with the DOI) ("Reclamation Indian Trust Asset Policy").[2]

The Indian Trust Assets ("ITAs") entitled to protection under the trust responsibility include water rights. 512 DM 2.2 (Dec. 1995). Thus, DOI has a trust responsibility to take all actions reasonably necessary to protect the Hualapai Tribe's water rights.

To help avoid or mitigate ITA impacts, DOI has adopted procedures requiring ITA impacts to be analyzed during the NEPA process for proposed actions. DOI procedures require that "[a]ny effect [on Indian trust resources] must be explicitly addressed in the planning/decision documents, including, but not limited to . . . Environmental Impact Statements. . . ." 512 DM 2.4(A) (emphasis added). Such documents "shall . . . [e]xplain how the decision will be consistent with the DOI's trust responsibility." Id.

Reclamation's procedures similarly require the assessment of impacts on ITAs from "[a]ctions that could impact the value, use or enjoyment of the ITA." Bureau of Reclamation, Indian Trust Asset Policy and NEPA Implementing Procedures: Questions and Answers About the Policy and Procedures (hereinafter "ITA Q&A"), Section IV-4 at 9 (Aug. 31, 1994) in Protection of Indian Trust Resources. "Such actions could include interference with the exercise of a reserved water right." Id. "[A]ll impacts, both positive or negative, should be analyzed and discussed." Id. Unavoidable impacts should be fully mitigated:

> The first strategy should be to avoid causing significant adverse impacts. When this is not possible, an attempt should be made to minimize such impacts. If adverse impacts do occur, the next step is to identify mitigation or compensation measures to offset adverse impacts so that there is no net loss to the Indian beneficial owners of the asset.

ITA Q&A, Section V-1 at 13.

While DOI has implemented its ITA policies through NEPA for administrative convenience, DOI's legal duties with respect to ITAs are not limited to NEPA's procedural requirements. NEPA requires, as a procedural matter, that an environmental impact statement "shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. By contrast, the trust duty is a substantive obligation to protect trust resources, not merely an obligation to make an informed decision.

[2] In February 1996, Secretary of the Interior Babbitt and Assistant Secretary Deer transmitted to Interior employees a compilation of the policies and procedures adopted by the bureaus and offices of the DOI relating to trust protection practices. This compilation is referred to herein as "Protection of Indian Trust Resources."

5

1 In addition to NEPA and trust duty, DOI must comply with various applicable Executive Orders and Presidential Memoranda, including: Executive Order 13084 of May 14, 1998, "Consultation and Coordination with Indian Tribal Governments" 63 Fed. Reg. 27655 (May 19, 1998); Memorandum of April 29, 1994, "Government-to-Government Relations With Native American Tribal Governments," 59 Fed. Reg. 22951 (May 4, 1994); and Executive Order 12898 of February 11, 1994, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," 59 Fed. Reg. 7629 (February 16, 1994).

Executive Order 13084 provides in pertinent part:

> In formulating policies significantly or uniquely affecting Indian tribal governments, agencies shall be guided, to the extent permitted by law, by principles of respect for Indian tribal self-government and sovereignty, for tribal treaty and other rights, and for responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments.

E.O. 13084, § 2, 63 Fed. Reg. 27655.

President Clinton's Memorandum of April 29, 1994 requires federal agencies to ensure that they operate within a government-to-government relationship with federally recognized tribes, consult with tribal governments to the greatest extent permitted by law prior to taking actions that affect them, and:

> assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs and activities.

Memorandum of April 29, 1994, §§ (a), (b) and (c), 59 Fed. Reg. 22951.

Executive Order 12898 requires in pertinent part that:

> [t]o the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs on minority populations and low-income populations.

E.O. 12898 § 1-101, 59 Fed. Reg. 7629.

6

1: Reclamation respectfully believes that appropriate consultation with Indian Tribal Governments occurred with respect to the development of interim surplus criteria. A full listing of the consultations during the development of the interim surplus criteria is found in Section 5.4.

The Proposed Interim Surplus Criteria Would Have Significant Adverse Impacts on the Hualapai Tribe's Colorado River Water Rights.

The Supreme Court held in Arizona v. California that the water uses on each reservation within a Basin state must be accounted for out of the water allocated to that state. See 376 U.S. at 343. This means that the Hualapai Tribe's mainstream water rights are included in Arizona's 2.8 million acre-feet apportionment. Adoption of the surplus criteria will increase the Lower Basin States' reliance on the use of unquantified water rights, and thereby increase their incentive to oppose the quantification of unquantified Indian water rights in the Lower Basin. As a result, the Tribe's ability to access these waters for beneficial uses in the future will be jeopardized.

1a

The DEIS acknowledges that the proposed action will diminish the ability of the tribes in the Ten Tribes Partnership to utilize their undeveloped Colorado River water rights in precisely this manner. The DEIS states:

> The Ten Tribes have a significant amount of undeveloped water rights. The availability of surplus water on the Colorado River is primarily a direct result of unused existing entitlements, including those of the tribes. The interim surplus criteria could make other entitlement holders develop a reliance on surplus water, provide a disincentive for those entitlement holders to support future development, and have the practical effect of diminishing the tribes' ability to utilize their entitlements.

DEIS at 3.14-2.

The DEIS should acknowledge that the proposed action will diminish the Hualapai Tribe's ability to utilize its entitlements for the same reasons. The inability to beneficially use its vast Colorado River water rights is unquestionably a significant impact on the Hualapai Tribe and its trust resources. Strangely, the DEIS is silent on the Hualapai Tribe's water rights, as discussed in the following section.

The DOI Violates NEPA and the Trust Duty by Ignoring the Proposed Action's Impacts on the Hualapai Tribe's Water Rights.

The DEIS fails to analyze – or even mention – the proposed action's impacts on the Hualapai Tribe's water rights. This omission is a violation of NEPA, the trust duty and Executive Order 12898.

2

In Section 3.14, "Indian Trust Assets," the DEIS purports to analyze the proposed action's impacts on ITAs. In this section, the DEIS discusses the water rights of each of the tribes in the Ten Tribes Partnership and the tribes served by the CAP. Id. at 3.14-1 to 3.14-22. Section 3.14 includes a detailed analysis of impacts on the CAP tribes' water rights. Id. at 3.14-

7

1a: The interim surplus criteria will not alter the quantity of priority of Tribal entitlements. In fact, as noted by the description of the Tribes' water rights above, the Tribes have the highest priority water rights on the Colorado River. Surplus determinations have been made by the Secretary since 1996, and surplus water supplies have been utilized by valid Colorado River contractors under the Secretary's annual surplus determinations since that date. Adoption of ISC will not make any additional surplus water available as compared with current conditions, but rather will provide more objective criteria for surplus determinations and will quantify the amounts of surplus water to be made available on an annual basis. Reclamation does not believe that identifying the limited amounts of surplus water will provide any additional disincentives for Tribal water development. Interim surplus criteria are also intended to complement efforts by California to reduce its over reliance on surplus water. The selection of any of the alternatives of this proposed action does not preclude any entitlement holder from using its water rights.

16 to 3.14-22. Section 3.14 provides the brief description of how the proposed action could impact the Ten Tribes Partnership tribes' water rights (quoted above at page 7), but fails to include a comparable analysis of impacts on their water rights. Id. at 3.14-2. However, this section says nothing at all about the Hualapai Tribe's water rights.

cont'd

We cannot fathom why DOI would ignore our water rights when it is well aware of them. The fact that the Hualapai Tribe's mainstream Colorado River water rights have not been adjudicated does not change their status as ITAs and does not excuse DOI from analyzing the impacts on those water rights. See page 4 above. Indeed, the DEIS at least discusses the Navajo Nation's unadjudicated mainstream Colorado River water rights, albeit without a meaningful analysis of the proposed action's impacts on those rights. DEIS at 3.14-5.

3

The DEIS also fails to disclose the proposed action's disproportionate impacts on the Hualapai Tribe in the "Environmental Justice" section of the document. The Hualapai Tribe clearly is a "minority" and "low-income" population within the meaning of Executive Order 12898 on Environmental Justice. The proposed action would have a disproportionate impact on the Hualapai Tribe (and similarly situated tribes, including the Navajo Nation and Havasupai Tribe) by treating their unquantified Colorado River water rights as "surplus" water and making that water available for the benefit of predominately non-minority water users.

Under the trust duty and policies and regulations discussed above, the DEIS must explicitly address the proposed action's impacts on the Hualapai Tribe's water rights and explain how the proposed action will be consistent with DOI's responsibility to protect these water rights. In addition, the DOI must ensure that the Hualapai Tribe's water rights are protected and the proposed action's impacts on those rights are avoided or sufficiently mitigated. We have repeatedly urged the DOI to quantify the Hualapai Tribe's water rights prior to or concurrent with actions – including the establishment of surplus criteria – that will significantly impact our ability to utilize our water rights.

4

Although we have asked DOI to quantify our water rights prior to or concurrent with adopting surplus criteria to ensure that our rights are protected, we understand that DOI nonetheless intends to issue the criteria by the end of this year. If DOI adheres to that schedule, then we demand that DOI immediately commence quantification of our water rights and complete quantification early in the implementation of the interim surplus criteria and prior to the first five year review of the interim surplus criteria. To do otherwise would irreparably diminish the Tribe's ability to utilize its water rights and would exacerbate DOI's past failures to protect the Tribe's water rights.

The DOI Violates NEPA and the Trust Duty by Failing to Analyze the Proposed Action's Socioeconomic Impacts on the Hualapai Tribe.

8

3: Unquantified Colorado River water rights cannot be analyzed and as such does not constitute an environmental justice issue for this EIS.

4: See response to Comment 49-1.

The DEIS also fails to analyze the proposed action's significant socioeconomic impacts on the Hualapai Tribe. These impacts stem from the diminishment of the Tribe's future ability to develop its water rights and from the anticipated unavailability of the Pearce Ferry boat take out due to the reduction in Lake Mead water levels. Because these impacts fall disproportionately on the Hualapai Tribe, they are environmental justice impacts as well as socioeconomic impacts.

The Hualapai Tribe's only hope for economic development, including tourism, rests in its ability to access sufficient water resources to sustain development. By increasing the Lower Basin States' dependence on unquantified mainstream Indian water rights and resistance to quantification of those rights, the proposed action will create formidable political and financial obstacles to the Tribe's access to sufficient water resources. Without a sustainable water supply for economic development, the Tribe cannot attain economic self-sufficiency. The DEIS completely ignores these significant impacts.

5 The proposed action will also severely compromise Tribal revenues and job creation from river running. The Hualapai River Runners is the river-running operation of Grand Canyon Resort Corporation ("GCRC"), a Tribal corporation wholly owned by the Hualapai Tribe. Hualapai River Runners conducts guided white water river trips commencing at Diamond Creek, and float trips commencing at Quartermaster Canyon. All boats on these trips take out at Pearce Ferry. A portion of the payment for each trip is for a trespass fee imposed by Hualapai Tribal ordinance. The Tribe is entitled to receive from GCRC the trespass fees and a portion of the total revenues from the Hualapai River Runners' operations. The Tribe also levies sales tax on each trip sold by the Hualapai River Runners. In the past, the funds that the Tribe receives from the Hualapai River Runners operations have comprised a significant portion of the Tribal general fund budget, and the Tribe anticipates that these funds will also be an important Tribal revenue source in the future. The general fund budget supports social programs on the Reservation, including youth education and substance abuse rehabilitation programs. The jobs provided by Hualapai Rivers Runners are one of the few employment opportunities on the Reservation and are an important factor in fighting Reservation unemployment and poverty.

The DEIS fails to evaluate these significant impacts. Instead, the DEIS merely states that "[t]his concession [the Diamond Creek to Pearce Ferry river trips] may be affected if trips encounter changes in availability of the Pearce Ferry take out." DEIS at 3.9-34. There is no doubt that Hualapai River Runners would be significantly adversely impacted by the proposed action. As acknowledged in the DEIS, "[a]t pool elevations of 1170 feet msl, the Pearce Ferry take out is inaccessible and boaters must paddle an additional 16 miles to South Cove to take out." Id. The DEIS predicts that all alternatives except the Flood Control Alternative would reduce pool elevations below 1170 feet msl and the Flood Control Alternative would result in an elevation of 1171 feet msl. Id. Table 2-1 at 2-17. In fact, Pearce Ferry take out is likely to be inaccessible at higher pool elevations: a recourse manager for Lake Mead National Recreation Area advised the Hualapai Tribe this week that Pearce Ferry will be inaccessible

9

5: Sections 3.9.2.2.3 and 3.9.2.3.2 of the FEIS have been expanded to include additional detail with regard to the importance of Pearce Ferry to the Hualapai, based on the Tribes comments on the DEIS. Note that although baseline conditions and the interim surplus criteria alternatives under consideration would result in increased probabilities for lower Lake Mead surface elevations over time, the primary influence on Lake Mead elevation reductions results from increases in Uper Basin depletions.

at 1183 msl because of sedimentation. Consequently, Hualapai River Runners trips would be forced to take out at South Cove under all alternatives. This impact is unacceptable.

cont'd

Taking out at South Cove would cost the Hualapai River Runners in fuel, time, safety, and labor costs, and will likely cost the Hualapai River Runners in lost business. A South Cove takeout would delay the takeout time by one to two hours, exhausting the river guides and preventing the Hualapai River Runners from meeting the timetables for the package tours through which a substantial portion of these trips are sold. If the Hualapai River Runners cannot meet these schedules, their business partners may cease booking blocks of trips with the Hualapai River Runners. The Hualapai Tribe would be harmed by lost sales tax, trespass fee payments and percentage of revenue entitlements, and by increased unemployment on the Reservation.

6

The DOI Violates NEPA, the Trust Duty, the NHPA, and Executive Order 13007 by Failing to Evaluate Cultural Resource Impacts, Protect Cultural Resources, and Consult with the Hualapai Tribe and Tribal Historic Preservation Officer.

The DOI has completely overlooked its duties to avoid adverse effects to Hualapai traditional cultural properties ("TCPs") on Hualapai Tribal lands and to preserve and provide Hualapai access to Hualapai TCPs and sacred sites on federal lands. The DOI has also failed to undertake the required consultation with the Hualapai Tribe and Tribal Historic Preservation Officer ("THPO") regarding these TCPs and sacred sites.

Section 106 of the NHPA, 16 U.S.C. § 470f, requires federal agencies to take into account the effects of their "undertakings" (actions) on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment. Congress amended the NHPA in 1992 to require consultation with Indian Tribes, to allow THPOs to assume the consultation and concurrence role afforded State Historic Preservation Officers ("SHPOs") for undertakings on tribal lands, and to clarify that properties of traditional religious and cultural importance to an Indian Tribe are eligible for inclusion on the National Register of Historic Places ("NRHP") (i.e., that they can be historic properties). See 16 U.S.C. §§ 470a(d)(2), 470a(d)(6)(A), and 470a(d)(6)(B). The Hualapai THPO assumed the role of the SHPO for Hualapai Tribal lands by agreement with the National Park Service in 1996.

The DEIS states that "Reclamation has determined development and implementation of interim surplus criteria meets the definition of an undertaking, but an undertaking that is without potential to effect historic properties." DEIS at 5-3. Hence, the DEIS concludes, "Reclamation has fulfilled its responsibilities to take into account the effects of the development and implementation of interim surplus criteria on historic properties." Id.

This conclusion is based on an erroneous assumption that "there is virtually no chance cultural resources retaining qualities that would qualify them for consideration as historic properties potentially eligible for inclusion on the NRHP exist within the [area of potential

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6: Thank you for your comments and for bringing to our attention your concerns regarding Reclamation's on-going operation of the Upper and Lower Colorado River. Per a request from the Nevada State Historic Preservation Officer (SHPO), the matter of effects to historic properties that might result from development of Interim Surplus Criteria (ISC) has been forwarded to the Advisory Council on Historic Preservation (Council). Development and implementation of ISC falls within the range of on-going operations, and the reservoirs and the River will continue to be operated within historic operational parameters under both baseline conditions and action alternatives. Because of this, Reclamation believes many of the issues you raise with regard to historic properties are better addressed under Section 110, rather than Section 106 of the National Historic Preservation Act. Reclamation is aware of its responsibilities under Section 110 for managing historic properties on lands under its jurisdiction and will commit to consulting with the Hualapai and other tribes within that framework. In accordance with the direction provided by EO 13007, Reclamation is also committed to working with the Hualapai and other tribes with ties to the Lower Colorado River to accommodate access to and use of sacred sites, and to the extent practicable, not adversely affect the physical integrity of sacred sites which have been identified by the tribes as being located on lands under its jurisdiction. If the Hualapai or other tribes have information concerning sacred sites that are being impacted by on-going reservoir and river operations, Reclamation urges the tribes to bring these situations to the attention of the appropriate Reclamation office.

effect] of the present undertaking" because these cultural resources "have been repeatedly inundated, exposed, and re-inundated" since Hoover Dam and Glen Canyon Dam were constructed. Id. at 3.13-5. In other words, DOI is assuming that water and weathering have rendered all otherwise eligible properties ineligible for the NRHP.

Such an assumption is not valid for "properties of traditional religious and cultural importance to an Indian Tribe" eligible for the NRHP under 16 U.S.C. §470a(d)(6)(A). The DEIS is apparently invoking the requirement under the criteria of NRHP eligibility that the property have "integrity of location, design, setting, materials, workmanship, feeling, and association." See 36 C.F.R. § 60.4. However, as explained in National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties":

> A property may retain its traditional cultural significance even though it has been substantially modified. . . . [T]he integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation.

cont'd

National Park Service, National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" at 10.

Moreover, a "structure" need not remain in order for a TCP to be a historic property eligible for the NRHP:

> Construction by human beings is a necessary attribute of buildings and structures, but districts, sites and objects do not have to be the products of, or contain, the work of human beings in order to be classified as properties. . . . A natural object such as a tree or a rock outcrop may be an eligible object if it is associated with a significant tradition or use.

Id. at 9.

Clearly, DOI cannot assume without consultation with the Hualapai Tribe and THPO that the proposed undertaking "is without the potential to effect" Hualapai TCPs. By these comments, the Hualapai Tribe and THPO place the DOI on notice that they believe Hualapai TCPs and sacred sites both on and off Hualapai tribal lands may be adversely affected by the proposed undertaking. DOI must consult with the Hualapai Tribe and THPO in compliance with NHPA § 106 and the Advisory Council's regulations at 36 C.F.R. Part 800. DOI also must fulfill its trust duty to the Hualapai Tribe to protect Hualapai TCPs located on Tribal lands as trust resources. To the extent consistent with the need to keep Hualapai TCP information confidential to protect the sites from vandalism and ensure that ceremonial use is not hindered, DOI also must disclose impacts on these sites in the DEIS.

11

In addition, the proposed action may adversely affect Hualapai TCPs or sacred sites on federal lands in violation of Section 110 of the NHPA and Executive Order 13007 of May 24, 1996, "Indian Sacred Sites." The proposed action also may hinder access to and ceremonial use of Hualapai sacred sites on Federal lands in violation of Executive Order 13007.

Section 110 of the NHPA requires, among other things, that federal agencies preserve historic properties owned or controlled by them and provide a process for identifying and evaluating historic properties in consultation with Indian tribes. See 16 U.S.C. § 470h-2(a). Executive Order 13007 requires that:

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> In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites.

E.O. 13007, § 1(a), 61 Fed. Reg. 26771 (May 29, 1996).

Executive Order 13007 further requires federal agencies with land management authority – including the DOI – to promptly implement procedures for carrying out the above requirement, including "procedures to ensure reasonable notice is provided of proposed actions . . . that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites." Id. § 2(a). Such procedures must comply with the Presidential Memorandum of April 29, 1994 on "Government-to-Government Relations with Native American Tribal Governments." Id.

The proposed surplus criteria may affect access to or ceremonial use of or adversely affect, Hualapai TCPs on sacred sites on federal lands, including lands within Lake Mead National Recreation Area or Grand Canyon National Park. In order to identify TCPs and sacred sites and determine whether such effects would occur, DOI must consult with the Hualapai Tribe and THPO.

To date, DOI has failed to conduct the consultation and evaluation required by NHPA §§ 106 and 110 and Executive Order 13007. DOI has also failed to analyze the impacts of the proposed action on Hualapai TCPs and cultural sites in violation of NEPA. DOI must comply with these duties prior to adopting surplus criteria.

The DOI is in Violation of Its Trust Duty by Failing to Consult with the Hualapai Tribe Regarding the Proposed Action, its Impacts and Appropriate Mitigation. 7

In addition to the consultation duty under NHPA §§ 106 and 110, DOI has a trust duty to consult with the Hualapai Tribe regarding the proposed action, its impacts and appropriate

7: The operation of the Colorado River and the development of interim surplus criteria are complex and highly technical in nature. A considerable effort was made to balance the needs of all members of the public and write the DEIS in language that could be understood by both a technical and non-technical audience. The writers of the DEIS acknowledge the difficulty of accomplishing this task. For the FEIS, the writers of the document have made a further effort to use plain language whenever possible. Chapter 5 has been modified to more fully describe the process to consult with Tribes. Several meetings regarding interim surplus criteria were held in which the Hualapai Tribe was invited.

cont'd

mitigation, as discussed above on pages 4-6. DOI has failed to meet this duty to date, despite prompting by the Tribe.

The Hualapai Tribe has implored the DOI to work with the Tribe to quantify and protect its water rights numerous times over the years. In the past year, we have repeatedly requested consultation on several matters that are likely to have significant adverse impacts on the Hualapai Tribe's water rights. These matters include the proposed settlement in CAWCD v. United States, the reallocation of Central Arizona Project water supplies, and the proposed surplus criteria. For example, in April of this year we asked Deputy Secretary David Hayes to convene a consultation meeting with the Hualapai Tribe, the Havasupai Tribe and the Navajo Nation to discuss issues of mutual concern to these tribes. See letter from Louise Benson, Chairwoman, Hualapai Tribe, to David Hayes, Deputy Secretary of the Interior, April 7, 2000 (attached). In December 1999, we requested a meeting with Secretary Babbitt, Assistant Secretary Kevin Gover, and Solicitor John Leshy to discuss the Hualapai Tribe's Colorado River issues. This request was in response to the Secretary's public statement that the federal government should actively engage Indians in discussions regarding Colorado River water issues. See letter from Louise Benson, Chairperson, Hualapai Tribe, to Hon. Bruce Babbitt, Secretary of Interior, December 27, 1999 (attached). When we called the Secretary's office to arrange a meeting shortly after we sent this letter, we were informed that he did not have time to meet with us.

The DEIS may mislead decision makers to believe that DOI has consulted with the Hualapai Tribe on the Interim surplus criteria. The DEIS offers numerous broad assurances that the appropriate consultations with tribes have occurred. In Section 3.14, "Indian Trust Assets," the DEIS asserts that "Reclamation has entered into government-to-government consultations with potentially affected tribes to identify and address concerns for Indian trust assets." DEIS at 3.14-1. The DEIS further asserts that these "potentially affected tribes" include tribes in the Ten Tribes Partnership, tribes served by the Central Arizona Project ("CAP"), and unnamed "other interested tribes within the Lower Colorado Region." Id. Similarly, under the section headed "Environmental Justice," the DEIS asserts that "Reclamation has involved potentially affected tribes and the Bureau of Indian Affairs to identify and address tribal concerns. . . . This includes tribes with reservations along the Colorado River, as well as tribes with Colorado River water rights in the Basin States." Id. at 3.15-1 to 3.15-2. This section cites Section 3.14 and Chapter 5 of the DEIS. Chapter 5, entitled "Consultation and Coordination," simply asserts that "[s]ince May 1999, Reclamation has had numerous meetings with the various tribes who have an interest in the implementation of ISC." Id. at 5-4.

The Hualapai Tribe is plainly a "tribe with a reservation along the Colorado River," a "tribe with Colorado River water rights in the Basin States," and a "tribe with an interest in the implementation of the ISC." Yet DOI has not "involved" us in the process of developing the criteria and evaluating their impacts, much less formally consulted us as required by its legal obligations.

13

DOI has Failed to Make the DEIS a "Clear and Concise Statement" that is "Understandable" to the Public, in Violation of NEPA and Executive Order 12898.

As stated in the NEPA regulations of the Council on Environmental Quality ("CEQ"), "NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken." See 40 C.F.R. § 1500.1(b). To "make the NEPA process more useful to decisionmakers and the public," CEQ regulations specify that "Environmental impact statements shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses." See id. §§ 1500.2(b) and 1502.1. CEQ regulations further require that "[e]nvironmental impact statements shall be written in plain language and may use appropriate graphics so that decisionmakers and the public can readily understand them." See id. § 1502.8.

Similarly, Executive Order 12898 requires that "[e]ach Federal agency shall work to ensure that public documents . . . relating to human health or the environment are concise, understandable, and readily accessible to the public." Executive Order 12898, § 5-5(c), 59 Fed. Reg. 7629 (emphasis added). As explained in President Clinton's Memorandum on Environmental Justice accompanying Executive Order 12898, one of the purposes of that order is "to provide minority communities and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment." Memorandum on Environmental Justice, February 11, 1994, Pub. Papers of the President, 1994 Book I at 241.

8

The DEIS for the proposed interim surplus criteria fails to meet these standards for plain language, understandability, and low-income and minority community access. The hydrology modeling discussion, in particular, is so technical as to be incomprehensible to anyone lacking advanced education in hydrology. The graphs used to illustrate the text only make the concepts more difficult to understand. Yet understanding the hydrology modeling discussion is essential to understanding the environmental impacts of the proposed action because virtually all of the impact analysis is based on the hydrology model output. This defect in the DEIS has hindered the Hualapai Tribe's ability to understand, review and comment on the DEIS.

For example, the Tribe has concerns about the impacts of Lake Mead water elevations on the water quality, aquatic resources, cultural resources and shorelines and shoreline vegetation, as well as the potential for further inundation of the Tribe' lands. However, the Tribe cannot independently assess these impacts and develop comments on them because the hydrology modeling discussion is so incomprehensible.

Accordingly, the DEIS should be rewritten in plain language and recirculated for public comment.

14

8: The DEIS and FEIS are technical documents and as such, contain substantial technical information. Reclamation has made every effort possible to provide extensive, understandable explanations of the technical analysis in the DEIS and FEIS. Further, during the public comment period, Reclamation conducted technical meetings and public hearings to receive questions and provide explanation on the technical aspects of the studies conducted and information presented in the DEIS. The dates and times of these meetings were published in letters mailed to interested parties, local newspapers and in the Federal Register. Furthermore, Reclamation also accommodated various agencies and other entities by meeting with them, at their request, to provide explanation on the technical aspects of the studies conducted and information presented in the DEIS. As such, Reclamation is of the opinion that it has made every effort possible to meet or exceed the standards for plain language, understandability, and low-income and minority community access. Chapter 5 of the FEIS entitled "Consultation and Coordination" includes Reclamation's public involvement process and coordination. See also response to Comment 49-7.

Conclusion and Request for Compliance, Consultation, and Quantification of the Hualapai Tribe's Colorado River Water Rights.

For the reasons discussed above, DOI is in violation of its trust duty to the Hualapai Tribe, its NEPA obligation to disclose the proposed action's significant impacts on the Hualapai Tribe and its trust resources, its NHPA §§ 106 and 110 duties with regard to Hualapai TCPs, its obligations under Executive Orders 12898, 13007, and 13084, and its associated consultation and mitigation duties. To bring DOI into compliance with these duties, the Hualapai Tribe urges DOI to:

1. Immediately commence quantification of our Colorado River water rights and complete quantification early in the implementation of the interim surplus criteria and prior to the first five year review of the interim surplus criteria;

2. Revise the DEIS to include analysis of the impacts on the Hualapai Tribe's water rights;

3. Revise the DEIS to include analysis of the socioeconomic impacts on the Hualapai Tribe;

4. Comply with the NHPA § 106 process for taking into account the proposed action's impacts on cultural resources of concern to the Hualapai Tribe;

5. Protect the integrity of and access to Hualapai sacred sites on federal lands;

6. Mitigate significant Hualapai socioeconomic, environmental, public and cultural resource impacts;

7. Rewrite the DEIS in plain language;

8. Recirculate the DEIS for public comment after making the revisions requested above; and

9. Complete all of the foregoing through government-to-government consultation with the Hualapai Tribe.

So that we may expeditiously begin the required consultation, we urge DOI to contact immediately Hualapai Chairperson Louise Benson, Director of Natural Resources Clay Bravo, and Tribal Historic Preservation Officer Monza Honga to schedule a meeting in September 2000 with Deputy Secretary Hayes and Ms. Debbie Saint of Reclamation's Lower Colorado Regional Office.

15

HUALAPAI NATION
OFFICE OF THE CHAIRMAN

Louise Benson
Chairman

P.O. Box 179 • Peach Springs, Arizona 86434 • (520) 769-2216

Aaron Mapatis
Vice Chairman

The Honorable Bruce Babbitt
United States Department of the Interior
Office of the Secretary
1849 C. St. N.W.
Washington, D.C. 20240

December 27, 1999

Mr. Secretary:

At the Colorado River Water User's Association Meeting in Las Vegas, Nevada on December 17th, you addressed the audience stating there are two priorities in the next millennium: the Environment and Indians. You also stated that the Federal Government should actively engage Indians in discussions regarding Colorado River Water Issues.

In light of your speech, the Hualapai Tribe respectfully requests to have a meeting with yourself, Assistant Secretary, Mr. Kevin Gover, and Department of Interior Solicitor, Mr. John Leshy, to discuss the Colorado River issues of our Tribe.

The Tribe remembers the promise you made in 1994, during the California Condor release at Vermillion Cliffs, to visit the Reservation. We will be contacting your office after the New Year to set a meeting date. If there are any questions, please contact myself or Clay Bravo, Director of Natural Resources at 520-769-2255.

Sincerely,
HUALAPAI TRIBAL COUNCIL

Louise Benson

Louise Benson,
Chairperson

This document is an attachment ot the Hualapai Nation's Septermber 8, 2000 comment letter. All relevant comments are addressed above in response to the September 8, 2000 letter.

HUALAPAI NATION
OFFICE OF THE CHAIRMAN
Chairman
P.O. Box 179 • Peach Springs, Arizona 86434 • (520) 769-2216
Vice Chairman

April 7, 2000

Mr. David Hayes
Deputy Secretary of the Interior - MS 7229
1849 C Street NW
Washington, DC 20240

RE: Proposed Stipulated Settlement - *CAWCD v. U.S.*

Dear Mr. Hayes:

Although the Hualapai Tribe of Arizona has myriad concerns regarding its reserved rights claims to the waters of the Colorado River mainstream, these comments are submitted in the context of the proposed stipulation intended to accomplish the settlement of the above referenced case. It is our hope that you will consider an early meeting with the Hualapai Tribe, together with the Havasupai Tribe and Navajo Nation, to discuss issues of mutual concern to these tribes. To that end, the Hualapai Tribe assures you that it is in unity with the concerns expressed by the Navajo Nation in its letter to you dated April 4, 2000.

The Tribe, likewise, expresses the concerns set forth in the comments submitted by the Ten Tribes Partnership regarding the proposed stipulation. The briefing held in Phoenix on March 14, 2000, provided very little opportunity for those in attendance to adequately express their concerns, both because of short notice of the briefing and the limited time available to discuss the implications of the proposal upon the water rights of the mainstream Tribes, both adjudicated and unadjudicated.

The Colorado River is the northern boundary of the Hualapai Reservation (which encompasses the lower portion of the Grand Canyon) for a distance of approximately one hundred twenty miles. It is superfluous to say that this is an area of great natural beauty which has been inhabited by the Hualapai since time immemorial. Although some economic benefit is realized from a development known as Grand Canyon West and through fees paid by outfitters

This document is an attachment to the Hualapai Nation's Septermber 8, 2000 comment letter. All relevant comments are addressed above in the response to the Septermber 8, 2000 letter.

and guides, with a sustainable water supply the potential for future development and use of this area to the benefit of the Tribe is enormous, if done in a culturally sensitive manner.

The Tribe has subsisted on this land for hundreds of years, using the meager water resources available on tributary systems due to the lack of financial resources and the will of the United States to quantify and assist in the development of the Tribe's mainstream water rights in one of the great rivers of North America, which fortuitously flows through the Reservation. In *Arizona v. California*, the United States filed a claim on behalf of the Tribe only to abandon it without explanation. Some forty years later, the Tribe's trustee has neglected to take any action to protect the Tribe's water. Now, because the proposed action of the Department jeopardizes the future ability of the Tribe to access these waters for beneficial uses, the Tribe will fall further behind in its drive toward economic self-sufficiency.

The Navajo Nation has made a very coherent case for the quantification and development of the mainstream rights of the three tribes omitted in the *Arizona v. California* adjudication prior to, or at the least in conjunction with, the CAWCD settlement. To avoid redundancy, the Tribe will not repeat that analysis. The failure to quantify and protect the tribe's rights in the mainstream adjudication was a clear breach of trust. We believe that the Department will compound this breach of trust responsibility by going forward with this settlement without first addressing Hualapai's mainstream rights. The Tribe's only hope for development, including tourism, rests in its ability to access sufficient water resources to sustain such development. The settlement of this action, as proposed, may well deprive the Tribe of this one opportunity at self-sufficiency.

On behalf of the Hualapai Tribe, I urge you to convene an early meeting with the three mainstream tribes whose rights are not protected by decree. Thank you for your consideration.

Very truly yours,

Louise Benson

Louise Benson, Chairwoman

NAVAJO NATION DEPARTMENT OF JUSTICE
OFFICE OF THE ATTORNEY GENERAL

LEVON B. HENRY
ATTORNEY GENERAL

BRITT E. CLAPHAM, II
DEPUTY ATTORNEY GENERAL

September 8, 2000

VIA TELEFAX : 702-293-8042 & email: jharkins@lc.usbr.gov.

Jayne Harkins
Attention BCOO-4600
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 49006-1470

Re: Draft Environmental Impact Statement ("Draft EIS or DEIS") on the Colorado River Interim Surplus Criteria

Dear Ms. Harkins:

Please consider this letter as comments submitted on behalf of the Navajo Nation concerning the above-referenced Draft EIS. These comments are intended to supplement the comments submitted by the Colorado River Basin Tribes Partnership on behalf of the ten tribes, including the Navajo Nation, with Colorado River allocations. Those comments will not be reiterated here, but should be considered as submitted by the Navajo Nation as though fully set forth herein.

GENERAL COMMENTS

In general, the Draft EIS is a fundamentally flawed document since no effort was made to account for the unquantified water rights of the mainstream tribes above Lake Mead in Arizona: the Navajo Nation,[1] the Havasupai Tribe, and the Hualapai Tribe (herein "the Arizona Mainstream Tribes above Lake Mead"). Reclamation, in all of its capacities relating to Colorado River operations, has historically ignored the rights of the Arizona Mainstream Tribes above Lake Mead to a quantity of Colorado River, and the Draft EIS continues this practice. The Draft EIS is also fundamentally flawed because Reclamation does not recognize tribal entitlements to Colorado River water, whether quantified or unquantified, to constitute an Indian Trust Asset to be protected from

[1] The Navajo Nation has submitted extensive comments to the Bureau of Reclamation concerning its unquantified mainstream water rights. *See:* Letter to Bruce Ellis, re Draft Environmental Impact Statement (EIS) on the Allocation of Water Supply and Long-Term Contract Execution, Central Arizona Project (CAP), Arizona, August 23, 2000 with attachments: Letter to Bruce Ellis, re Public Scoping for Proposed Allocation of Water Supply and Expected Long-Term Contract Execution, CAP, September 27, 1999; Letter to Carol Lynn Erwin, Area Manager, Bureau of Reclamation - Phoenix Area Office, re Nonbinding Plans to Use Reallocated Water from the CAP, December 29, 1999; Letter to Bruce Ellis, re Supplemental Comments re Public Scoping for Proposed Allocation of Water Supply and Expected Long-Term Contract Execution, CAP; Letter to David J. Hayes, Deputy Secretary, Department of the Interior, re Navajo Mainstream Claims, April 4, 2000; and Letter to Secretary Babbitt, re Navajo Mainstream Colorado River Rights in Arizona, August 1, 2000.

P.O. Drawer 2010 • Window Rock, Navajo Nation (AZ) 86515 • (520) 871-6931 • Fax (520) 871-6177

adverse impacts resulting from Reclamation policies and actions. DEIS at 3.14-1. Given the short shrift afforded the quantified water rights of the ten tribes, it is axiomatic that Reclamation would simply ignore the unquantified claims of the Arizona Mainstream Tribes above Lake Mead.

SPECIFIC COMMENTS

1. The Draft EIS Does Not Consider the Unquantified Water Rights of the Navajo Nation and the other Arizona Mainstream Tribes Above Lake Mead.

1

The Draft EIS makes no effort to incorporate an allocation of water for the Arizona Mainstream Tribes above Lake Mead in the analyses of the various surplus criteria, including the status quo. Reclamation merely acknowledges that "some tribal rights remain unadjudicated" (DEIS at 1-11). However, the discussion in the DEIS of the interests of the State of Arizona does not make reference to the claims of the Arizona Mainstream Tribes above Lake Mead. Therefore, no analysis was made of the potential impacts that may be visited on such claims through the adoption of the various surplus criteria, nor was any analysis made concerning how water uses by those tribes could affect the availability of water under the various surplus criteria.

In *Arizona v. California*[2] the Supreme Court did not attempt to quantify the water rights of the Mainstream Tribes above Lake Mead. Nevertheless, the Supreme Court recognized that any use of water above Lake Mead must be charged against the state in which such use is made.[3] Neither the 1964 Decree nor the 1979 Decree specifies a water right for the Navajo Nation, the Hualapai Tribe, or the Havasupai Tribe for mainstream water. However, if these tribes were allocated Colorado River water, the amount of water available to the Central Arizona Project would be diminished, affecting all the surplus criteria scenarios.

1: Comment noted.

2. The Failure to Consider the Unquantified Water Rights of the Navajo Nation Further Ensures the Continued Reliance by the Lower Basin States on Such Water Supplies.

2

By failing to acknowledge the unquantified water rights of the Navajo Nation, Reclamation continues to manage the Colorado River in a manner that ensures that other interests will continue to rely on water supplies claimed by, reserved for, and potentially belonging to the Navajo Nation. Reclamation has an affirmative obligation to operate federal water projects, such as Glen Canyon Dam and Hoover Dam, consistent with "vested, fairly implied senior Indian water rights."[4] As a general matter, the surplus criteria proposed by California and the Six States, effectively trade future shortage protection for interim surplus. Under such scenarios, it is logical to expect that the Lower

2: See response to Comment 52-1.

[2] *Arizona v. California*, 373 U.S. 546 (1963).

[3] 373 U.S. at 591.

[4] *Memorandum to Regional Director, Region One, U.S.F.W.S. et al.*, January 9, 1997; see also: *Kittitas Reclamation District v. Sunnyside Valley Irrigation District*, 763 F.2d 1032 (9th Cir.), *cert. denied*, 474 U.S. 1032 (1985), and *Joint Board of Control of Flathead, Mission and Jocko Irrigation Districts*, 832 F.2d 1127 (9th Cir. 1987). The Ninth Circuit recently affirmed these principles. Klamath Water Users Protective Assn v. Patterson, 191 F.3d 1115, 1122-23 (9th Cir. 1999) ("[T]he United States, as trustee for the Tribes, has a responsibility to protect their rights and resources...Because Reclamation maintains control of the Dam, it has a responsibility to divert the water and resources needed to fulfill the Tribes' rights, rights that take precedence over any alleged rights of the Irrigators.")

Basin States will have even more incentive to resist allocations of mainstream water for the Navajo Nation and the other Mainstream Tribes above Lake Mead.

In the comments submitted by the Ten Tribes Partnership, the Partnership notes that Reclamation, through its operations generally, and through the proposed surplus criteria specifically, is continuing to institutionalize the reliance by the Lower Basin States on unused tribal water supplies. Such reliance creates political disincentives for the development of the tribes' water supplies. In the case of Navajo Nation, the Lower Basin States rely on the lack of quantification of the Navajo right as a basis for their continued use of Colorado River water potentially belonging to the Navajo Nation. This not only creates institutional incentive against the development of Navajo water supplies, but it creates institutional incentives and political opposition against the efforts of the Navajo Nation to receive an allocation of Colorado River water and to otherwise quantify its mainstream water rights. The Draft EIS contains no analysis of the impacts attributable to the various surplus criteria on the ability of the Arizona Mainstream Tribes above Lake Mead to obtain Colorado River allocations; therefore, the Indian Trust Asset analysis is entirely deficient for these tribes.

2 cont'd

3. The High Priority of Indian Water Rights Does Not Reduce the Institutional Reliance on Surplus Water Nor Diminish the Disincentive Against Tribal Water Development.

At S.3.14.2, concerning the Indian Trust Assets[5] of the Ten Tribes Partnership, the Draft EIS acknowledges that:

> The interim surplus criteria could make other entitlement holders develop a reliance on surplus water, provide a disincentive for those entitlement holders to support future development, and have the practical effect of diminishing the tribes' ability to utilize their entitlements.

3

(DEIS at 3.14-2.) Reclamation's explanation that the "interim surplus criteria will not alter the quantity or priority of the tribal entitlements" is entirely inapposite. The institutional reliance on unused tribal water creates disincentives toward tribal water development *notwithstanding* the high priority of such rights. The tribes lack the political clout to develop their water. Because tribal water has such high priorities, non-Indian water users will use their political clout to ensure that tribal water is not developed, thereby protecting non-Indian water supplies.[6] In the case of Navajo Nation, its claim for Colorado River water with an early priority only ensures the continued opposition by the Lower Basin States to the quantification of the Navajo right. The claimed early priority provides no protection from the institutional opposition to such a claim. The Draft EIS does not acknowledge the potential claims; therefore, it offers no analysis of how the various surplus criteria would affect such claims. The Draft EIS is entirely deficient in this respect and should be redone.

[5] The comments here will not attempt to address Reclamation's absurd contention that tribal entitlements to present perfected federal reserved rights are not ITAs. (DEIS at 3.14-1.) That contention is addressed in the comments submitted by the Ten Tribes Partnership.

[6] *See* John B. Weldon, Jr., *Non-Indian Water User's Goals: More is Better, All is Best* in INDIAN WATER IN THE NEW WEST 79, 83 (1993)("[M]any non-Indian appropriators would prefer to use political clout in Congress to prevent the tribes from obtaining the funds necessary to exercise their reserved rights.")

3: Reclamation respectfully disagrees and does not believe that the DEIS is deficient. Reclamation does not believe that identifying the limited amounts of surplus water will provide any additional disincentives for Tribal water development.

9- 8-00 4:52 PM ;NAVAJO NATION DEPT. OF JUSTICE 5208716177;# 6/ 8

4

Jayne Harkins, Bureau of Reclamation
Re: DEIS on the Colorado River Interim Surplus Criteria
September 8, 2000
Page 4

4. The Draft EIS Does Not Adequately Address the Impacts of Fluctuating Water Levels at Lake Powell on the Navajo Nation's Marina.

4 At S.3.14.2.3, concerning the Indian Trust Assets of the Navajo Indian Reservation the Draft EIS acknowledges that the Navajo Nation operates a marina at Lake Powell and the boat ramp is not operational when the lake level drops below 3,677 feet msl. (DEIS at 3.14-5.) Reference is made to Section 3.9.2.3.1 concerning Lake Powell elevations. Under the shortage criteria proposed by California and the Six States (and the Shortage Protection Alternative), lake levels would be significantly lower than under baseline conditions and the flood control alternative. It is not sufficient for the EIS to merely identify impacts; the EIS must identify how such impacts can be mitigated, particularly when Indian Trust Assets are involved.

5. The Draft EIS Mischaracterizes the Nature of Arizona's Upper Basin Apportionment.

5 In at least two separate sections, the Draft EIS mischaracterizes Arizona's Upper Basin apportionment of 50,000 acre-feet as a right to the *delivery* of water above Glen Canyon Dam. (DEIS at 1-18[7] & 3.4-3.[8]) This characterization is not consistent with Reclamations practice of counting every *use* of water by the Navajo Nation in the Upper Basin of Arizona against Arizona's Upper Basin apportionment of 50,000 acre-feet. Despite Reclamation's accounting procedures, there is no basis in the Upper Colorado River Basin Compact for the water uses by the Navajo Nation to be constrained by the Compact.[9]

Conclusion

For reasons expressed in this letter, the Draft EIS is fundamentally flawed. The Draft EIS does not consider the implications of the unquantified Navajo mainstream Colorado River rights or how the implementation of the various surplus criteria adversely interferes with the Navajo Nation's efforts to settle or quantify such mainstream rights.

Sincerely,

NAVAJO NATION DEPARTMENT OF JUSTICE

Stanley M. Pollack
Water Rights Counsel

[7] "In Arizona, there are several points of diversion plus up to 50,000 af delivered above Glen Canyon Dam." The reference to Glen Canyon Dam should be to Lees Ferry. Nevertheless, very little water is actually delivered above the dam. Instead, Reclamation charges all water uses by the Navajo Nation in the Arizona portion of the Upper Basin against Arizona's 50,000 acre-foot apportionment.

[8] "In addition, Arizona is also charged for use of water pumped from Lake Powell under the state's Upper Basin apportionment of 50,000 afy." Arizona is charged for water *used*, not necessarily *pumped*.

[9] *See* Article XIX (a) Upper Colorado River Basin Compact, 1948 ("Nothing in this Compact shall be construed as: (a) Affecting the obligations of the United States of America to Indian tribes.").

4: See response to Comment 51-3(b).

5: Upper Basin accounting procedures are based on use, not delivery, and the Compact point is a better reference point for the Upper Basin than Glen Canyon Dam. The FEIS has been modified accordingly. Please see response to Comment 50-1 regarding resolution to Tribal water rights being constrained by the Upper Colorado River Basin Compact.

NAVAJO TRIBAL UTILITY AUTHORITY
AN ENTERPRISE OF THE NAVAJO NATION

September 7, 2000

BCOO/BOC
4600

Ms. Jayne Harkins
Bureau of Reclamation
Attn: BCOO – 4600
P.O. Box 61470
Boulder City, NV 89006-1470

RE: Comments on Draft EIS on Colorado River Interim Surplus Criteria

Dear Ms. Harkins:

The Navajo Tribal Utility Authority (NTUA) has numerous interests in the operation of dams in the Upper and Lower Colorado River Basins. NTUA has reviewed the Draft EIS on the Interim Surplus Criteria and finds that there will be significant impacts to NTUA. NTUA has the following concerns and comments on the scope of the proposed EIS.

1 a. NTUA is a member of the Colorado River Energy Distributors Association and purchases approximately 22 MW of hydropower from the Colorado River Storage Project (CRSP). We feel that generating capacity at Glen Canyon Dam will be reduced and higher cost replacement power will impact NTUA significantly.

2 b. The existence of Lake Powell will also be affected in some manner and will have an impact on NTUA's, and the Navajo Nation's, plans to capitalize on tourism and economic development on the Lake. NTUA has expended considerable energy and resources on the development of Antelope Point Marina at Lake Powell and we are concerned.

3 c. Water in the Colorado River, its tributaries, and the associated lakes are sources of Indian water rights. For example, water in Lake Powell helps the Upper Colorado River Basin meet its commitments to Lower Basin States under the Colorado River Compact of 1922, thus, firming up the water supply for the Navajo Indian Irrigation Project. Calls of water from the Upper Basin are made from Lake Powell and may be affected from

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1: Please see response to Comment 16-2.

2: Reclamation recognizes the Navajo Nation's concerns with regard to facilities at Antelope Point. Section 3.9 of the EIS discusses potential effects of interim surplus criteria on shoreline facilities at Lake Powell, including those at Antelope Point. The analysis in Section 3.9 of the FEIS has been modified to consider the probability of Lake Powell surface elevations occuring below 3,677 ft msl (as opposed to an elevation of 3,670 ft msl considered in the DEIS) and 3626 ft msl, based upon information provided by the NPS and the Navajo Nation.

3: (a) Reclamation recognizes that the Navajo Nation is a preference customer at Glen Canyon Dam. The status of a Tribe doesn't sanction any more of a status than that of a preference customer. This action will in no way affect the Tribes right to the power. Impacts to the power and energy produced at Glen Canyon Dam are found in Section 3.10. The Department does not view this as a trust asset as we are not affecting the contract right to the power. (b) Section 3.9.2.2.2 discusses impacts to Lake Powell and the operation of Antelope Point Marina. Reclamation and the Department have considered the analysis and feel the ISC alternatives are minor impacts to Lake Powell elevations. Reclamation and the Department believe that inflows and increasing UB depletions will have a greater impact on Lake Powell water surface elevations. The Marina and any other economic ventures on Lake Powell need to take into consideration the normal operational ranges of Lake Powell. (c) In the DEIS, Reclamation attempted to consider all Indian water rights that could be affected by interim surplus criteria, covering both adjudicated and non-adjudicated water rights. For the FEIS, Reclamation's RiverWare model, which simulates the operation of the Colorado River Basin, was modified to more accurately and precisely account for Indian water rights.

cont'd

interim surplus criteria. The draft EIS must include Indian water rights which are vested property rights to meet the present and future needs of Indian Tribes, regardless of whether those rights have been adjudicated or otherwise formally recognized and regardless of whether those rights have been exercised.

The impacts of the surplus criteria on NTUA deserve full analysis and discussion in the EIS process. NTUA will be willing to assist in any way possible to achieve this goal. I can be reached at (520) 729-6203 or email bhanley@ntua.com.

Sincerely yours,

Benjamin W. Hanley
Government Liaison

Sep-08-00 07:57A Ute Mtn Chairman's Office (970) 565-2313 P.01

OFFICE OF THE CHAIRMAN

Ernest House, Sr.
Chairman
Ute Mountain Ute Tribe

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September 7, 2000

Jane Harkins
USBR
Boulder City, NV

FAX: 702-293-8042

Re. Colorado River Interim Surplus Criteria DEIS

While we appreciate USBR's survey of Ute Mountain Ute Tribe reserved water rights set forth in the DEIS, we are concerned that Reclamation fails to set forth in the document any commitment to protect these important Indian trust assets.

1 On one hand Reclamation acknowledges it has a duty to protect the Ute Mountain Ute Tribe's water rights (p.3-14-1), but on the other hand Reclamation ignores the Tribe's concern that the surplus criteria analysis will perpetuate California's reliance on unused Tribal water (p.3-14-2). Reclamation needs to stand up and make an affirmative

2 statement in the final environmental impact statement and in the underlying record of decision that its Lower Colorado River Water Master policies will never be utilized to reduce directly or indirectly the development of the Ute Mountain Ute Tribe's water rights. We request on behalf of our Tribe and the other Tribes in the Upper and Lower Basin that such a commitment be expressly stated in the final EIS.

Thank you for this opportunity to comment.

Very truly yours,

Ernest House, Sr., Tribal Chairman
Ute Mountain Ute Tribe

1: The Department is working closely with the State of California to reduce its over reliance of Colorado River water. The selection of the Basin State alternative as the preferred alternative brings with it satisfactory progress measures and reversion to conservative surplus criteria if those progress measures are not met. The Depratment believes this will provide incentive to California to reduce its use of Colorado River water.

2: In response, Reclamation states that its policies with respect to the proposed action will not serve to reduce the development of the Ute Mountatin Ute Tribe's water rights.

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September 8, 2000

VIA E-MAIL TO jharkins@lc.usbr.gov, AND FACSIMILE TO (702) 293-8042 AND FIRST-CLASS MAIL

BC00
4600

Regional Director Robert Johnson
Bureau of Reclamation Lower Colorado Region
c/o Jayne Harkins
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P.O. Box 61470
Boulder City, NV 89006-1470

Re: **Colorado River Interim Surplus Criteria Draft Environmental Impact Statement (July 2000)**

Dear Mr. Johnson and Ms. Harkins:

The Nordhaus Law Firm is general counsel to the Jicarilla Apache Tribe. The Jicarilla Apache Tribe, through its designated representative, Mr. Joe Muniz, is serving as President of the Colorado River Basin Tribes Partnership, which is also known as the Ten Tribes Partnership. On behalf of Mr. Muniz, I am transmitting with this cover letter the comments of the Ten Tribes Partnership to the above-referenced draft environmental impact statement.

Attachment A to the Ten Tribes Partnership's comments cannot be e-mailed, but will be included in the fax and in the hard copy that are being sent to you this day.

Very truly yours,

NORDHAUS, HALTOM, TAYLOR,
TARADASH & BLADH, LLP

Jessica R. Aberly

Mr. Johnson and Ms. Harkins
September 8, 2000
Page 2

JRA\slg

Enclosure: Ten Tribes Partnership Comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

cc: Designated Representatives and Legal Counsel for the Partnership's Member Tribes
Mr. Ron Bliesner and Mr. Andrew Keller, Keller-Bliesner Engineering, Technical Consultants for the Ten Tribes Partnership

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TEN TRIBES PARTNERSHIP COMMENTS ON THE COLORADO RIVER INTERIM SURPLUS CRITERIA DRAFT ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

The Colorado River Basin Tribes Partnership is composed of four tribes with quantified or otherwise congressionally-sanctioned water rights in the Upper Colorado River Basin, including the Ute Indian Tribe of the Uintah and Ouray Reservation, Southern Ute Indian Tribe, Ute Mountain Ute Tribe, and Jicarilla Apache Tribe; and, five tribes in the Lower Colorado River Basin whose water rights on the mainstream of the Colorado River were decreed in *Arizona v. California*, including the Fort Mojave Indian Tribe, Colorado River Indian Tribes, Chemehuevi Indian Tribe, Cocopah Indian Tribe, and the Quechan Indian Tribe. The tenth member is the Navajo Nation, which has quantified or otherwise congressionally-sanctioned water rights in both the Upper and Lower Basin. The Partnership is informally called the Ten Tribes Partnership and referenced as such throughout this document. References to Tribal, Tribe, and Indian throughout this text refer to the Partnership Tribes only and not to other Indian tribes within the Colorado River Basin.

1 cont'd below

The Colorado River Interim Surplus Criteria – Draft Environmental Impact Statement ("DEIS") is deeply and fatally flawed. It fails to take into account and analyze the impacts of the various surplus scenarios on the water right assets of the Partnership's members. These water rights are Indian trust assets and, therefore, entitled to the highest degree of impact analysis and protection by the Bureau of Reclamation ("Reclamation"). The DEIS fails to provide even minimal analysis of impacts and, with respect to the five Tribes located in the Lower Basin, complete disavows any obligation to do so. The lack of an analysis of the impacts on the Partnership members' trust resources, as recommended by the Partnership throughout its consultation with Reclamation, undermines the accuracy, thoroughness, and adequacy of the DEIS and requires that the

1: The statement in the DEIS made by Reclamaton was in error. This statement has been modified.

1 cont'd | analysis now be properly completed and a revised DEIS be published for public review and comment.

The Partnership's comments are set forth below. First, we address the various legal misstatements and legal inadequacies within the document. These are followed by our technical comments which more specifically address the nature of the Tribes' water rights and the analysis required to fully describe and address the impacts on those trust assets.

LEGAL ISSUES AND COMMENTS

I. THE WATER RIGHTS OF ALL TEN PARTNERSHIP TRIBES ARE INDIAN TRUST ASSETS AND MUST BE TREATED AS UNIQUE IN THE DEIS ANALYSIS

2 | The DEIS's discussion of Indian Trust Assets ("ITAs"), beginning at page 3.14-1, contains confusing misstatements regarding the legal status of the Partnership Tribes' water rights and an inadequate analysis of the impacts of interim surplus criteria on those trust assets. Contrary to all law and in conflict with the position taken by the United States at least since the negotiation of the Colorado River Compact of 1922, the DEIS asserts that the United States does not hold the water rights which were reserved in trust for the benefit of the Fort Mojave, Colorado River, Chemehuevi, Cocopah and Quechan Tribes ("Five Lower Basin Tribes"). However, the discussion that follows this inexplicable and unsupportable contention refers to the water rights of the "Ten Tribes." *See* DEIS at 3.14-2. Of course, there is no principled basis for the position in the DEIS that the water rights of the Five Lower Basin Tribes are not held in trust and should not be treated as ITAs.

3 | The Department of the Interior's ("Interior") fundamental error in refusing to acknowledge its trust duties cannot be cured in the absence of a new draft environmental impact statement. In short, Interior's denial of its trust responsibilities contaminates the entire analysis of the potential effect on the Five Lower Basin Tribes of the implementation of surplus criteria. Having concluded in the DEIS that it has no trust responsibility related to the Five Tribes' water rights, Interior, by definition, could not have properly considered those obligations in its analysis of the surplus criteria. Indeed, in addition to Interior's trust responsibilities, it is clear that the Tribal water rights hold a unique status within the "Law of the River," which status requires Interior to examine such rights independently rather than merely including the tribal rights among the other rights that are treated as part of the "system" water supply. Interior never conducted such an analysis. Because Interior never sought to investigate the effect on the tribal water rights from its perspective as trustee for the Five Lower Basin Tribes nor did it account for the unique status of the tribal rights on the River, it must now prepare a new draft analysis that considers these special circumstances.

A. The United States Has Acknowledged its Trust Responsibilities to the Tribes in *Arizona v. California*.

2: Reclamation was in error. See Section 3.14 for additional analysis.

3: See Section 3.14 for additional analysis. After review of this additional material, the Department has made the decision that a new draft was not necessary.

The water rights of the Five Lower Basin Tribes are established pursuant to the Decree in *Arizona v. California*, 376 U.S. 340 (1964). From the outset of that case, the United States steadfastly asserted that it was appearing as trustee for the Tribes. *E.g.*, *Petition of Intervention on Behalf of the United States of America* ¶ 27 (Dec. 1953) ("US intervenes 'as trustee for the Indians and Indian Tribes'"); *Arizona v. California*, 373 U.S. 546, 595 (1963). Indeed, as late as 1978, the United States contended that tribal intervention was not necessary because the federal government was appearing on behalf of the Tribes. *See Memorandum in Opposition to the Three Tribes Motion* (Feb. 1978). Ultimately, the United States acquiesced in tribal intervention, although continuing its role in the litigation as trustee for the Five Lower Basin Tribes. *Motion of the United States for Modification of Decree and Supporting Memorandum* at 5 (Dec. 1978) ("The present motion is submitted by the United States as trustee for, and guardian of, the Tribes of the Fort Mojave, Chemehuevi, Colorado River, Fort Yuma and Cocopah Indian Reservations on the lower Colorado River"). Nothing in any of the Court's opinions or decrees suggests, or even hints, that the Five Lower Basin Tribes' water rights are anything but held in trust by the United States.

Moreover, nothing in Interior or Reclamation policy suggests that tribal water rights established under federal law are not trust assets which must be fully protected by federal agencies. In a wide variety of circumstances, Interior has treated such water rights as trust assets and conducted the sort of rigorous investigation -- sorely lacking here -- that is needed to understand the potential effect of the activity in question and to determine whether the activity should proceed in light of the impact on the Tribes or whether means were available to offset adverse effects. *See, e.g.*, Bureau of Reclamation *Animas-La Plata Project, Colorado-New Mexico, Final Supplemental Environmental Impact Statement* (July 14, 2000).

B. The Partnership Tribes' Water Rights Are, and Must Be Treated As, Unique Under the "Law of the River."

The DEIS also ignores the unique nature of Tribal water rights under the "Law of the River," a term used to denote the various compacts, legislation, court decrees and regulations that determine how the Colorado River is controlled and operated. The foundation for the "Law of the River" is the Colorado River Compact, which expressly provides: "Nothing in this Compact shall be construed as affecting the obligations of the United States of America to Indian tribes." Colorado River Compact of 1922, Art. VII. That provision leaves the Secretary of the Interior's ("Secretary") trust responsibilities undiminished by the enactment of the Compact and controls the relationship between *all* the Partnership Tribes, including the Five Lower Basin Tribes, and the United States concerning the operation of the Colorado River. The authoritative role of Article VII of the Compact in the "Law of the River," and its preservation of the Secretary's trust responsibilities, is expressly confirmed by the Boulder Canyon Project Act, 45 Stat. 1057, which provides: "The rights of the United States in or to waters of the Colorado River and its tributaries howsoever claimed or acquired, as well as those claiming under the United States, shall be subject to and controlled by said Colorado River Compact."

45 Stat. 1064 § 13(b), 43 U.S.C. § 617*l*.(b)(1928). Thus, the Secretary's duties to the Partnership Tribes are not affected – let alone curtailed – by the "Law of the River."

Nothing in *Arizona v. California* alters that conclusion. To be sure, the Decree in that case is frequently cited for the proposition that the Secretary is authorized to release water not used in one state in any one year for use in another. *See* DEIS at 1-12. In fact, the Decree is far less permissive: holding only that the Secretary of the Interior is *not prohibited* under the Decree from "releasing such apportioned but unused water during such year for consumptive use in the other States." *Arizona v. California*, 376 U.S. at 343. This lack of prohibition does not provide definitive authority for the Secretary, whose trust duties to the Tribes remain unaffected, to release from storage "water controlled by the United States," which the Secretary holds in trust for the Tribes, if the sole purpose is to facilitate water use by other water users along the River.

The DEIS never addresses the unique status of the tribal rights under the "Law of the River" or the fact that the Secretary, and Reclamation acting on the Secretary's behalf, have special obligations with regard to the water rights of the Five Lower Basin Tribes. Before embarking on his ambitious agenda of establishing interim criteria, the Secretary must examine the effect of such criteria on the rights all Partnership Tribes, including the Five Lower Basin Tribes. To construct the proper framework in the DEIS for that analysis, Interior must first recognize its trust responsibilities to all of the Partnership Tribes and the unique position which Tribal rights have under the "Law of the River."

C. Reclamation, Acting on Behalf of the Secretary, Is Subject to Exacting Standards if its Actions Affect the Water Rights of the Partnership Tribes.

The DEIS fails to acknowledge the United States' obligations to the Five Lower Basin Tribes and fails to properly analyze the potential effects on all ten Partnership Tribes from the adoption of interim surplus criteria. In the absence of a proper accounting of the effect of the proposed action on the Tribal rights, it is difficult to determine the appropriate steps that Reclamation, on behalf of the Secretary, should take to offset any adverse impact on the Tribes. It is clear, however, that Interior is subject to demanding standards that require it to take all possible actions to protect and promote the Tribal interests at stake.

Perhaps the most succinct statement of Interior's obligations is set forth in Secretarial Order 3215 - Departmental Responsibilities for Indian Trust Resources (Apr. 28, 2000). It is clear from this Order that Interior, including Reclamation, has an obligation under the present circumstances both to account for the potential effect on Tribal water rights and to ensure that its action "promotes," as well as "protect[s] and maintain[s]," *see* DEIS at 3.14-1, the interests of the Tribes and their water rights.

Case law also demonstrates that far more is required than the minimal discussion found in the DEIS. In *Pyramid Lake Paiute Tribe of Indians v. Morton*, 354 F.Supp. 252, 256-57 (D.C. 1972), the Pyramid Lake Tribe challenged regulations promulgated by

Reclamation to regulate the operation of the Newlands Project, a federal Reclamation project in Nevada. The Tribe charged that Reclamation had not adequately considered the tribal interests in crafting the regulations that controlled the water supply available to the project. The district court agreed:

> In order to fulfill his fiduciary duty, the Secretary must insure, to the extent of his power, that all water not obligated by court decree or contract with the District goes to Pyramid Lake. The United States, acting through the Secretary of the Interior, "has charged itself with moral obligations of the highest responsibility and trust. Its conduct as disclosed in the acts of those who represent it in dealings with the Indians, should therefore be judged by the most exacting fiduciary standards.
>
> * * *
>
> The Secretary was obliged to formulate a closely developed regulation that would preserve water for the Tribe. He was further obliged to assert his statutory and contractual authority to the fullest extent possible to accomplish this result. Difficult as this process would be, and troublesome as the repercussions of his actions might be, the Secretary was required to resolve the conflicting claims in a precise manner that would indicate the weight given to each interest before him. Possible difficulties ahead could not simply be blunted by a "judgment call" calculated to place temporarily conflicting claims to precious water. The Secretary's action is therefore doubly defective and irrational because it fails to demonstrate an adequate recognition of his fiduciary duty to the Tribe. This also is an abuse of discretion and not in accordance with law.

The DEIS does not comport with this exacting standard, both because it fails to fully acknowledge Interior's trust responsibility and because it never attempts to analyze the effect on the Five Lower Basin Tribes of the various criteria which it considers.

The fact that the Secretary effectively serves as water master on the River does not alter the conclusion that he must act consistent with his trust responsibility to the Tribes. In *Jicarilla Apache Tribe v. Supron Energy Corp.*, 728 F. 2d 1555, 1567 (10th Cir. 1984) (Seymour, J. concurring in part, dissenting in part), *as modified*, 782 F.2d 855 (10th Cir.)(en banc)(per curiam)(adopting dissenting opinion of Seymour, J.), *cert. denied sub nom., Southern Union Co. v. Jicarilla Apache Tribe*, 479 U.S. 970 (1986), Judge Seymour clearly spelled out the steps that the Secretary must take when his role as an administrator requires him to deal with assets which he holds in trust for Tribes:

> When the Secretary is acting in his fiduciary role rather than solely as a regulator and is faced with a decision for which there is more than one "reasonable" choice as that term is used in administrative law, he must choose the alternative that is in the best interests of the Indian tribe. In

short, he cannot escape his role as trustee by donning the mantle of administrator . . . . (citation omitted.)

728 F.2d at 1567. *Accord Burlington Resources Oil & Gas Co. v. United States Department of Interior*, 21 F. Supp. 1, 4-5 (D.C.D.C. 1998) (Secretary's decision must satisfy the "arbitrary and capricious" standard *and* provide optimum advantage for the trust beneficiary). Reclamation's own ITA policy acknowledges Interior's trust responsibility as well as the undeniable fact that the ITAs entitled to protection by Reclamation include Indian federal reserved water rights. *See* Bureau of Reclamation, *Indian Trust Asset Policy* (Aug. 31, 1994) ("Reclamation ITA Policy"), in Attachment A, United States Department of the Interior, *Protection of Indian Trust Resources* (notebook on file with the Department of the Interior) ("Protection of Indian Trust Resources").

II. RECLAMATION FAILS TO FULLY ANALYZE THE IMPACTS TO THE INDIAN TRUST ASSETS OF THE PARTNERSHIP TRIBES IN VIOLATION OF RECLAMATION'S OWN INDIAN TRUST ASSET POLICY

4 cont'd below

A. In Keeping with its Trust Duty to the Partnership Tribes, Reclamation Must Explicitly Address the Proposed Action's Impacts on the Ten Tribes' Water Rights and Must Avoid or Mitigate Those Impacts.

In accordance with the exacting fiduciary standards discussed above, Interior and Reclamation have adopted policies and procedures to ensure that their actions comply with the trust responsibility. Interior's policy, to which Reclamation is subject, states that it will "recognize and fulfill its legal obligations to identify, protect and conserve the trust resources of federally recognized Indian tribes and tribal members." 512 DM 2.3 (Dec. 1995), in "Protection of Indian Trust Resources." Interior's procedures require that "[a]ny effect [on Indian trust resources] *must be explicitly addressed* in the planning/decision documents, including, but not limited to . . . Environmental Impact Statements . . . ." 512 DM 2.4(A) (emphasis added). Such documents "*shall* . . . [e]xplain how the decision will be consistent with the Department's trust responsibility." *Id.* (emphasis added).

In describing this duty, Reclamation states that the trust responsibility "requires that the United States, as trustee, [deal] with the trust assets in the same manner [as] a prudent person would deal with his own assets." Bureau of Reclamation, *Indian Trust Asset Policy and NEPA Implementation Procedures: Questions and Answers About the Policy and Procedures* ("ITA Q&A"), Section II-1 at 4, in "Protection of Indian Trust Resources."[1] In fulfillment of the trust responsibility, Reclamation commits in its own ITA policy to:

[1] Reclamation's policy statements regarding the proper discharge of the trust responsibility should be interpreted in light of the "guiding principles" in Secretarial Order No. 3215, *supra*. The Secretarial Order cites as a "source of guidance" *Seminole Nation v. United States*, 316 U.S. 286, 296-97 (1942), wherein the United States Supreme Court stated that the government, in its dealings with Indians, is

4: Comment noted.

> carry out its activities in a manner which protects trust assets and avoids adverse impacts when possible. When Reclamation cannot avoid adverse impacts, it will provide appropriate mitigation or compensation.

Reclamation ITA Policy in "Protection of Indian Trust Resources."

Reclamation's procedures implementing its ITA policy require that the assessment of impacts on ITAs cover "[a]ctions that could impact the value, use or enjoyment of the ITA." ITA Q&A, Section IV-4 at 9. "Such actions could include interference with the exercise of a reserved water right." *Id.* Reclamation requires all impacts, whether positive or negative, to be analyzed and discussed. *See id.* Reclamation's analysis, according to its own policies and procedures, encompasses the following steps:

> The first strategy should be to avoid causing significant adverse impacts. When this is not possible, an attempt should be made to minimize such impacts. If adverse impacts do occur, the next step is to identify mitigation or compensation measures to offset adverse impacts so that there is no net loss to the Indian beneficial owners of the asset.

ITA Q&A, Section V-1 at 13.

According to its procedures, when implementing its ITA policy, Reclamation should perform interdisciplinary studies in order "to identify potential impacts and reasonable measures that could prevent or mitigate the adverse impacts." ITA Q&A, Section IV-7 at 10.

Reclamation's procedures for implementing its ITA policy also seek to uphold the United States' "government-to-government" policy by "[trying] to ensure that tribes are not treated as 'just another interest group.'" ITA Q&A, Section V-6 at 7. Reclamation's ITA policy recognizes that working "government-to-government" with tribes "requires that federal agencies design solutions and tailor federal programs, in appropriate circumstances, to address specific or unique needs of Indian tribes." *Id.*

Because the Partnership Tribes' water rights are Indian trust assets, *see* discussion *supra*, Reclamation must follow Interior's and its own ITA policies and procedures in addressing the Partnership Tribes' water rights in the DEIS. In accordance with these policies and procedures, the DEIS must explain and assure that the decision will be consistent with the trust responsibility by:

4 cont'd this page and next

a) Explicitly addressing how the proposed action, the development of specific interim surplus criteria, will impact the Partnership Tribes' water rights.

charged with "moral obligations of the highest responsibility and trust" and should be "judged by the most exacting fiduciary standard." *Id.*

b) Explaining how the proposed action will be consistent with Reclamation's responsibility to protect and promote these water rights.

c) Fully analyzing whether the proposed action *could* interfere with the Partnership Tribes' exercise of these water rights now or in the future.

d) Analyzing the impacts and reasonable mitigation measures based upon an interdisciplinary approach.

e) Designing mitigation solutions that recognize and promote the Tribes' unique relationship with the federal government.

f) Including, to the extent significant adverse impacts from the proposed action cannot be avoided, sufficient mitigation measures to ensure that the Partnership Tribes' water rights and the ability to exercise those water rights now or in the future are protected.

4 cont'd

As is discussed in more detail below, the DEIS is woefully lacking in meeting any of these obligations in its ITA analysis.

B. The DEIS Fails to Analyze the Significance of the Impacts on the Partnership Tribes' Water Rights and Fails to Discuss How the Impacts May Be Avoided or Mitigated.

Despite inconsistent statements to the contrary in the DEIS's summary, *see* DEIS at S-14,[1] and despite the DEIS's erroneous statement that the present perfected rights of the Five Lower Basin Tribes are not ITAs, the DEIS clearly states that the proposed action could have a significant impact on the Indian trust assets of the Partnership Tribes. The DEIS recognizes that a substantial portion of the surplus later made available under the interim criteria is "primarily a direct result of unused existing entitlements, including those of the [Ten] tribes," whom, the document recognizes "have a significant amount of undeveloped water rights." DEIS at 3.14-2. Having recognized that fact, the DEIS concludes that the development of an interim surplus criteria has the "practical effect of diminishing the tribes' ability to utilize their entitlements." *Id.* There is, however, no analysis of this clearly stated impact and no discussion of how such an impact might be mitigated.

5 cont'd below

Notwithstanding the perfunctory presentation, Interior and Reclamation have recognized that establishing interim surplus criteria will create a disincentive for the

[1] In fact, the conclusory statement in the DEIS summary, that water availability for the Partnership Tribes would be unaffected because the Partnership Tribes' water rights "have priorities sufficiently early in time," is inaccurate. The erroneous statement ignores the fact that many of the Partnership's Upper Basin Tribes have *subordinated* senior priority dates as part of congressional settlements or project authorizations.

5: The Department acknowledges this concern and recognizes that a number of Tribes have been unable to use their entitlement to date. The Department is committed to making progress to help Tribes make better use of their water rights. In the Upper Colorado Region, Reclamation and the Department have undertaken numerous efforts to pursue opportunities for the Ten Tribes to utilize their water rights. Implementation of water right settlements for both the Northern Ute Tribe and the Jicarilla Apache Tribe continues to be a focus of the Department, along with seeking final implementation of the Colorado Ute settlement. In addition, the Department is working with the Navajo Nation on reapportionment of the Navajo Reservoir, which will assist efforts to move the Navajo Indian Irrigation Project towards completion. Efforts also continue on a settlement of the Little Colorado River.

In the Lower Colorado Region, Reclamation and the Department have likewise undertaken numerous efforts to pursue opportunities for various Tribes to utilize their water rights. The Department has worked for years to address the needs of Lower Basin Tribes served by the Central Arizona Project in a comprehensive Arizona Water Rights Settlement. For example, recently this effort led to introduction of a bill in Congress that would address the claims of the Gila River Indian Community, resolving the largest Indian water rights claim in the western United States.

development of the Tribes' quantified but currently "undeveloped water rights." *Id.* Stated another way, the three Lower Basin States, and the water users within those States who benefit from the interim surplus criteria, now have (yet another) incentive to oppose and to seek to prohibit any further development of the Partnership Tribes' quantified federal reserved rights.[7] Although the DEIS thus correctly acknowledges that the proposed action could impact the value, use, or enjoyment of the Partnership Tribes' Indian trust assets, the DEIS fails to provide the thorough discussion and analysis of this impact that is necessary for decisionmakers and the public to understand both the extent of the impact and the need for mitigation. As discussed above, Reclamation is required to "explicitly address" the impacts on ITAs and to avoid or mitigate those impacts in a manner that recognizes, respects, and implements the trust relationship between the federal government and the Tribes. The DEIS explicitly addresses the extent of impacts to those Tribes with entitlements to Central Arizona Project water, but it contains no analysis of the magnitude of the disincentive that each of the various alternative proposed interim surplus criteria could have for development of the Partnership Tribes' water rights. Reclamation has not employed an "interdisciplinary" or any other analysis to properly assess the impacts of the alternatives on the Partnership Tribes. This is yet another reason why a revised draft environmental impact statement should be issued.

5 cont'd

By virtue of the fact that their rights are quantified, the Ten Tribes' rights can, and should be, explicitly accounted for, and assessed, *see also* n.3 *supra*, in a manner that reflects the actual value of using their water in various shortage, normal, or surplus determinations, as those determinations would be made according to the various alternatives in the DEIS. *See* discussion in the Technical Comments *infra*. Such an assessment is necessary in order to, at the very least, analyze the one impact Reclamation actually recognized in the DEIS at 3.14-1. Furthermore, having an analysis that is tailored to the specific and unique needs of the Partnership Tribes is in keeping with Reclamation's own policies to foster government-to-government relationships and to protect Indian trust assets. Because the DEIS contains literally no analysis of the one impact recognized in the DEIS, the disincentive to future water development by the Tribes, the Partnership has provided such an assessment. *See* discussion in the Technical Comments *infra*. As the Partnership's analysis reveals, the impact varies depending on the alternative criteria employed.

6

In addition to ignoring a complete analysis of the impacts, the DEIS fails to discuss appropriate mitigation for the Tribes. Such a discussion cannot occur, however, without performing the proper accounting of the effect that the proposed action will have

7 cont'd below

[7] It is important to note that this disincentive argument holds true for unquantified and undeveloped federal reserved water rights as well. The Partnership's request that a revised DEIS explicitly account for and analyze the amount of the disincentive on the Tribes' quantified rights does not diminish the need for Reclamation to also analyze, and mitigate impacts to, Indian federal reserved water rights that are not yet quantified. The analysis may be different, however. It is also important to note that, even if impacts to all Tribes and, indeed, the Six States, are lessened by establishing criteria that allows California to curtail its over dependence on the Colorado River, implementation of interim criteria still can, and does, have impacts.

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6: The Department does not believe this proposed action would preclude the Tribes or any entitlement holder from using their Colorado River entitlement. The interim surplus criteria will not alter the quantity or priority of Tribal entitlements. In fact, as noted by the description of the Tribes' water rights in Section 3.14, the Tribes have the highest priority water rights on the Colorado River. Surplus determinations have been made by the Secretary since 1996, and surplus water supplies have been utilized by valid Colorado River contractors under the Secretary's annual surplus determinations since that date. Adoption of ISC will not make any additional surplus water available as compared with current conditions, but rather will provide more objective criteria for surplus determinations and will quantify the amounts of surplus water to be made available on an annual basis. Reclamation does not believe that identifying the limited amounts of surplus water will provide any additional disincentives for Tribal water development. Interim surplus criteria is also intended to complement efforts by California to reduce its over reliance on surplus water. The selection of any of the alternatives of this proposed action does not preclude any entitlement holder from using its water rights.

7: The Department does not believe mitigation is warranted based upon the Department's conclusion that the proposed action will not adversely affect the water rights of the Tribes (or any entitlement holder).

7 cont'd

on the Partnership Tribes' quantified rights. Once the accounting is done and the impacts are analyzed, but before a preferred alternative is chosen, Reclamation has a duty to consult with the Tribes regarding mitigation determinations. *See* ITA Q&A, Section V-1 at 13 ("Mitigation determinations should be done as they are now, by consulting with affected Indian entities . . ."); *see also id.*, Section IV-11 at 11 ("[T]he government-to-government policy requires that tribal governments be consulted to the greatest extent practicable concerning actions with potential affects on . . . tribal ITAs . . . .").

8

III. A REVISED DEIS SPECIFICALLY ADDRESSING THE PARTNERSHIP WATER USE MUST BE CIRCULATED IN ORDER TO COMPLY WITH NEPA

A. Under NEPA, a Draft Environmental Impact Statement Must Fulfill and Satisfy to the Greatest Extent Possible the Requirements Established for the Final Environmental Impact Statement.

In addition to the deficient ITA analyses, the DEIS's discussion of the environmental impact of the proposed action is insufficient according to the National Environmental Policy Act, 42 U.S.C. §§ 4321-4370(d) (West Supp. 2000) ("NEPA") and its implementing regulations. The only cure for the deficiencies discussed herein, as provided by NEPA, is to recirculate a revised DEIS as it pertains to analysis of the Partnership Tribes' water rights and water use.

NEPA requires impact statements to include "a detailed statement by the responsible official on . . . the environmental impact of the proposed action." 42 U.S.C. § 4332 (C). *See also* 40 C.F.R. §§ 1508.8 and 1508.27 (1999). The fundamental purpose of this requirement is to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken." 40 C.F.R. § 1500.1 (1999). The Council on Environmental Quality's implementing regulations for NEPA apply to Reclamation's actions. *See id.* at § 1500.3. Those regulations provide that:

> [impact statements] shall provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment . . . . *Statements . . . shall be supported by evidence that the agency has made the necessary environmental analyses.* An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions.

40 C.F.R. § 1502.1 (1999)(emphasis added).

The Second Circuit has elaborated on these regulatory requirements and provided a concise summation of NEPA case law as it pertains to an impact statement's fundamental purpose:

8: Reclamation disagrees with the commentor's opinion that the ITA analysis is deficient and the environmental impact of the proposed action is insufficient. To meet the requirements of NEPA, it is common practice to update DEIS information in the FEIS as was the case on Tribal water rights and uses. Reclamation has used the best information available in the DEIS and has updated the ITA section appropriately. The determination of Tribal water rights and uses are legal matters beyond the scope of the proposed action. The NEPA process is not the vehicle to determine water rights of any party. Reclamation did not exclude identification or analysis of Tribal water rights or uses in the DEIS. The DEIS and FEIS identifies and appropriately analyzes impacts to Tribal water rights based on information available to Reclamation, thus Reclamation believes it is not required to recirculate a revised DEIS.

> The primary function of an [EIS] under NEPA is to insure a fully informed and well-considered decision . . . . In order to fulfill its role, the EIS must set forth sufficient information for the general public to make an informed evaluation, and for the decisionmaker to consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action. In so doing, the EIS insures the integrity of the process of decision by giving assurance that stubborn problems or serious criticisms have not been swept under the rug.

Sierra Club v. United States Army Corps of Engineers, 701 F.2d 1011, 1029 (2nd Cir. 1983) (internal citations and quotation marks omitted).

Moreover, NEPA requires that an agency prepare a draft environmental impact statement with the same general thoroughness as it will its final impact statement:

> Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process . . . . The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section [4332](2)(C) of the Act. If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion. The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.

40 C.F.R. § 1502.9(a)(1999). As discussed below, Reclamation must prepare and circulate a revised DEIS because the current DEIS is "so inadequate as to preclude meaningful analysis," *see id.*, Reclamation must prepare and circulate a revised DEIS.

B. The DEIS'S Analysis of Alternatives Is Incomplete Because it Does Not Contain the Water Use Projections for the Partnership Tribes' Water Rights.

9 cont'd below

In the DEIS model runs, Tribal water use is buried within the demand nodes used by the Colorado River Simulation System (CRSS). Diversions, in many cases, serve both Indian and non-Indian water users, making it difficult to determine the portion, or assumed portion, associated with each. Furthermore, the Tribes have not participated in the determination of their modeled demands or in the assumed water development schedules for each state. Thus, from the standpoint of the Partnership, the modeling of Tribal water in DEIS model runs is ambiguous. Unambiguous modeling of Partnership

9: Reclamation provided the Partnership with a grant for participation in this process. CRSS has been modified based on the data provided by the Partnership and subsequent discussions with the Partnership consultants clarifying that data.

9 cont'd

Tribes' water within CRSS requires representation of the Tribes' water at each node where the potential for present or future Tribal water demands exists. From this basis the Tribes can identify and fully participate in determining the schedule for their modeled demands. Accordingly, the Partnership submitted to Reclamation a nodal delineation of Tribal water rights and planned development schedules. *See* DEIS at Cover Sheet for Appendix O.

10

Although Reclamation had the requisite data from the Partnership, Reclamation omitted a complete analysis in the DEIS of the projected water use of the Partnership Tribes' quantified water rights. Although concern about impacts on the future development of these water rights was clearly raised during the scoping process,[4] the DEIS does not provide a substantive and meaningful discussion of the salient socioeconomic and environmental impacts that the alternatives could have on water use by the Tribes. If alternatives diminish the Partnership Tribes' ability to develop their water rights, those socioeconomic impacts must be described. Moreover, the DEIS fails to consider how the Ten Tribes' water use could affect the quantities of surplus water available under the various alternatives. Proper accounting of the Ten Tribes' ITAs begins with proper inputs into the model. This lack of any substantive discussion about data Reclamation had in its possession, but did not incorporate into the model, raises serious questions as to the accuracy of Reclamation's conclusions regarding environmental impacts of the proposed action.

11

Instead of considering the impacts of the Partnership Tribes' water use on available surplus in the DEIS, Reclamation merely promised that it will update its Colorado River Surplus Simulation ("CRSS") model "to include discrete representation of the Ten Tribes' updated use schedules and their full quantified entitlements for the Final EIS . . . ." DEIS at 3.14-2. Reclamation conceded that it had "a draft listing of the Colorado River system reaches and demand nodes which was provided to Reclamation by the Ten Tribes Partnership" before the DEIS was issued, but that "[t]his data was not incorporated into the model for this DEIS." DEIS at Cover Sheet for Attachment O. There is no explanation in the DEIS why the data were not considered prior to releasing the DEIS, or why Reclamation ignored pertinent information relevant to the scope of the DEIS. If Reclamation fulfills its promise to incorporate the Tribes' water use projections in the CRSS prior to issuing the FEIS, *id.*, those figures will significantly affect the amount of water now projected in the DEIS as available surplus and will require that Reclamation issue a revised draft statement for additional public comment.

12 cont'd below

In addition to precluding meaningful analysis of the proposed action, the failure to incorporate the Partnership's water use projections in the DEIS's model runs contravenes a fundamental purpose of NEPA, to "insure that environmental information is available

[4] *See* letter from Joe Muniz, Chairman, Ten Tribes Partnership, to Jayne Harkins, Chairperson, Colorado River Management Work Group, Bureau of Reclamation (June 8, 1999). *See also* Letter from Stanley M. Pollack, Water Rights Counsel, Navajo Department of Justice, to Jayne Harkins, River Operations Manager, Bureau of Reclamation (June 29, 1999).

10: The Department does not believe the alternatives of this proposed action preclude the Tribes from using their Colorado River entitltement.

11: Reclamation has incorporated the Partnerships' data into the model runs.

12: Comment noted.

12 cont'd

to *public officials and citizens* before decisions are made and before actions are taken." 40 C.F.R. § 1500.1 (1999) (emphasis added). NEPA is intended to maximize meaningful public participation in decisions that affect the quality of the human environment. *See id.* at §§ 1500.2(d) and 1506.6 (1999). This policy works in harmony with having as complete a DEIS as possible. *See id.* at § 1502.9(a). If the DEIS is complete, public feedback can be meaningful. In preparing its final environmental impact statement on interim surplus criteria, Reclamation must "assess and consider [public] comments . . . and shall respond . . . stating its response in the final statement." 40 C.F.R. § 1503.4(a) (1999). Reclamation has no corresponding obligation to respond to public comments after the FEIS is issued. Consequently, Reclamation's decision to omit incorporation of data in the DEIS regarding the Partnership Tribes' water use undermines a manifest policy that proposing agencies should "[e]ncourage and facilitate public involvement . . ." to the fullest extent possible. *Id.* at § 1500.2. This error can only be corrected by recirculating a revised DEIS which incorporates modeling runs and a discussion of Partnership Tribes' water use as it relates to the proposed interim surplus criteria.

TECHNICAL COMMENTS

I. SURPLUS ACCOUNTING

13

The Ten Tribes Partnership has consistently asserted that the Colorado River Interim Surplus Criteria EIS should include a full and explicit accounting of the water making up the surplus to the Lower Basin.[5] The Partnership contends that the surplus criteria alternatives cannot be properly evaluated without accounting for the sources of the surplus water.

The sources of surplus water to the Lower Basin, in order of declining magnitude during the interim period, are: storage drawdown in Lakes Mead and Powell; undeveloped Indian and non-Indian water in the Upper Basin; reduced spills (excess to Mexico); and reduced reservoir evaporation. The Partnership requests that this accounting be included in a revised DEIS and the final EIS.

14

[5] The Partnership submitted text to Reclamation describing the water rights of each Partnership Tribe which was incorporated by Reclamation in sections 3.14.2.1 through 3.14.2.10 of the DEIS. The Partnership recommends the following revisions to the text at section 3.14.2.6 discussing the Fort Mojave Indian Reservation. Revise the second paragraph as follows:

> The Fort Mojave Tribe claim to additional land and water rights in California was recently settled and confirmed by the United States Supreme Court in *Arizona v. California*, U.S. , 2000 WL 775538 at 17-18 (2000). That settlement provides an additional reserved water right in the amount of 3,022 acre-feet

Delete the first two sentences of the third paragraph because they reference a table that is not part of the DEIS. Add the following sentence at the beginning of the paragraph: "Water use by the Fort Mojave Tribe is estimated using records of electrical consumption at various pump stations and are not measured flows." The third paragraph should then start with "The CRSS model contains . . . ."

13: The Department declines the request to include the sources of water in the FEIS. Once tributary water commingles with Colorado River water it becomes Colorado River system water. This system water is used as such to make appropriate deliveries based on the Decree. The selection of any of the alternatives of this proposed action does not preclude any entitlement holder from using its water.

14: We have revised the second subparagraph under paragraph 3.14.2.6 in the FEIS to adopt these suggestions from the Ten Tribes Partnership.

A. Storage Drawdown

15 During the interim period the storage drawdown in Lakes Mead and Powell is the largest source of surplus water to the Lower Basin. The accelerated drawdown of stored water under the more liberal surplus criteria (Six States, Seven States, California, and Shortage Protection) effectively trades future shortage protection for interim surplus. However, over the course of 60 years the mean annual change in storage (initial storage less ending storage divided by the number of years) is close to the same for all alternatives and is no longer a source of surplus water.

B. Undeveloped Upper Basin Water

After the interim period, undeveloped Upper Basin Indian and non-Indian water accounts for the bulk of surplus water to the Lower Basin. During the interim period it is second to storage drawdown as a source for Lower Basin surplus. This source of Lower Basin surplus declines with time as the Upper Basin develops.

16 As explained earlier, the CRSS modeling for the DEIS did not explicitly include nodal representation of Upper Basin Indian water rights and development schedules. The Ten Tribes Partnership submitted to Reclamation a nodal delineation of the Tribal water rights and planned development schedule, which Reclamation states in the DEIS it intends to incorporate in the CRSS modeling for the Final EIS, and which incorporation requires the submission of a revised DEIS for public review and comment. *See* discussion *supra*. *See also* DEIS at Cover Sheet for Appendix O.

Based on the rights and development schedule provided in DEIS Appendix O, the current depletion by Upper Basin Tribes is 357 KAF per year versus a total rights and full development depletion of 728 KAF per year. Thus the undeveloped Upper Basin Tribal water right is 371 KAF per year. From the Upper Basin consumptive use schedule assumed for the DEIS modeling, the current total Upper Basin depletion is 3,836 KAF per year against an end of model run depletion of 5,204 KAF per year. Thus the total undeveloped water in the Upper Basin is assumed to be 1,368 KAF per year. The Indian portion of this total undeveloped Upper Basin water is 371/1,368 or 27%. This is the
17 fraction assumed by the Ten Tribes Partnership in developing this response to the DEIS.

The consequence of undeveloped Upper Basin water on water made available to the Lower Basin is simulated as the difference between model runs with scheduled development of Upper Basin water and runs with full development for all model years. Inherent in this approach is the assumption that scheduled water development will not be hindered as a result of disincentives associated with the surplus alternatives being analyzed. If scheduled development were curtailed then the analysis should be based on the difference between current use in the Upper Basin and full rights, which would demonstrate even greater reliance on undeveloped water and hence potential adverse impact to Indian trust assets.

15: See response to Comment No. 31-7 for a discussion of the results of interim surplus criteria implementation.

16: For the DEIS, the depletion schedules prepared and submitted by the Upper and Lower Basin states were used to model the basin water demands under normal, surplus and shortage water supply conditions. The states updated these schedules in consultation with the local agencies/tribes and Reclamation used the updated schedules in the modeling of the baseline conditions and surplus alternatives for the FEIS. All agency/tribe demands schedules are believed to have been appropriately modeled for the DEIS. However, for the DEIS, the demands of various agencies/tribes were clustered or aggregated at the respective nodal point on the model. For the FEIS, the demands of the individual agencies/tribes that have water service contracts with Reclamation and have direct diversions from the main stem Colorado River were disaggregated and modeled as individual demands at the respective nodal points on the model. See Attachment H which shows the Lower Basin use schedules and Attachment K which shows Upper Basin use schedules. All Tribes in the Ten Tribe Partnership, in the Lower Basin receive their scheduled depletion, with the exception of the Cocopah Tribe which has some Arizona Priority 4 water.

17: See response to Comment No. 53-16.

18

C. Reduced Spills

Relative to the Flood Control Alternative, each of the other alternatives results in less excess flows to Mexico. This reduction in spills from Lake Mead is the third largest source of surplus water to the Lower Basin.

19

D. Reduced Evaporation

With the accelerated drawdown of Lakes Powell and Mead the mean reservoir surface area is reduced with a consequential reduction in evaporation loss. This is the smallest source of surplus water to the Lower Basin. It is calculated relative to the evaporation occurring under the Flood Control Alternative, which has the largest mean reservoir storage and, accordingly, the largest mean annual evaporation loss.

20 cont'd below

II. LOWER BASIN TRIBAL ACCOUNTING POOL

The Lower Basin presently exceeds its compact apportionment, even though the Lower Basin Tribes have not fully developed their perfected water rights. This undeveloped portion of the Lower Basin Tribal depletion right is represented in all analyses as its proportionate share of the Lower Basin use, indicating that other users in the Lower Basin are presently consuming these depletion rights. In addition, this undeveloped portion of Lower Basin Partnership water could be tracked by in-reservoir accounting in Lake Mead explained in more detail below.

Because the undeveloped Five Lower Basin Tribes' water assets are an implicit component of the Lower Basin consumptive use they should be treated differently than the undeveloped Upper Basin water when analyzing the potential effects of the surplus criteria.

Since the Lower Colorado River Basin States presently receive more than their 7.5 million acre-feet (MAF) apportionment even though the Five Lower Basin Tribes have not fully developed their decreed right, the Lower Basin is implicitly using and relying on Tribal water. The consequence of undeveloped Lower Basin Tribal water could be tracked as the difference between model runs with and without full development as for the Upper Basin Tribal water. While tracking the Lower Basin Tribal rights on this annual basis is instructive and important to the Partnership, it is not a meaningful accounting method that reflects the true value of this trust asset. Impacts accounted for in this manner do not clearly reflect the value of the Tribal water thus used by others. For example, in wet periods when excess water is available, there would be no use of this water by others, yet in dry years its use becomes very important in off-setting shortages that would exist otherwise. Another accounting instrument is required that better represents this differential use. Accordingly, Partnership proposes to represent their unused Lower Basin water with in-reservoir accounting in Lake Mead. In addition to better assessing the use of Lower Basin Tribal water, this accounting method allows differential assessment of impacts among the alternatives. Such an accounting method

18: Comment noted.

19: Comment noted.

20: The Department declines the request to adopt a Lower Basin Tribal Accounting Pool.

provides the best tool for Reclamation, on behalf of the Secretary, to meet its trust responsibility to the Partnership.

In-reservoir accounting of the undeveloped Five Lower Basin Tribes' water will not conceptually change the surplus declaration alternatives or the simulated releases from Lake Mead. Rather, it is simply a bookkeeping process that determines the portion of surplus, normal, and shortage water delivered to other non-Partnership Lower Basin users as a result of undeveloped Ten Tribes' water in the Lower Basin. Because the Tribal Accounting Pool ("TAP") does not affect simulated releases from Hoover Dam, TAP accounting can be done as a post-modeling process provided all trigger elevations for Lake Mead surplus and shortage are output. However, the Partnership promotes having TAP explicitly incorporated into the simulation model as this will expedite the analysis and will better assist the Secretary in assessing the importance and significance of undeveloped Tribal waters in the Lower Basin consumptive use allowed by the various surplus criteria.

20 cont'd below

Presently, the undeveloped Lower Basin Partnership water is approximately 185 KAF annually. This amount decreases during the interim period due to development of Tribal Rights as represented in Appendix O of the DEIS, with an average of 155 KAF over the interim period. Thus, each year 155 KAF will be added to TAP. If excess flow is released to Mexico then TAP would be reduced by the lesser of the amount of excess flow and the volume in TAP. If top water banks maintained by others are operating, the reduction due to spill would be shared in proportion to the water in each bank and TAP. Evaporation would be charged to TAP according to its portion of the total Lake Mead surface area (difference between the surface area with and without TAP water).

Figure 1 shows various storage conditions in Lake Mead relative to surplus (+) and shortage (-) trigger elevations.

a) Under the condition shown in Figure 1a excess water would be delivered to Mexico and TAP would be reduced by the amount of excess. If the excess to Mexico exceeds the amount in TAP, TAP contents would be zeroed. The sharing of impact with top water banks discussed above would apply to this condition.

b) The condition shown in Figure 1b would result in a surplus delivery with or without TAP and no water would be withdrawn from TAP.

c) Under the condition shown in Figure 1c a surplus would be declared. Without TAP a normal release (no surplus) would be declared. Because it is the contents of TAP that put the lake level above the surplus trigger elevation and allow a surplus to be declared, an amount equal to the lesser of the surplus and TAP contents would be added to the tally of surplus water resulting from the undeveloped Lower Basin Tribal water and withdrawn from TAP.

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d) The condition shown in Figure 1d would result in a normal delivery with or without TAP and no water would be withdrawn from TAP.

e) Under the condition shown in Figure 1e a normal delivery would be declared. Without TAP shortage would occur. Since it is the contents of TAP that put the lake level above the shortage trigger elevation and allow normal delivery rather than shortage, an amount equal to the lesser of TAP and the difference between normal and shortage deliveries would be added to the tally of normal water (shortage relief) resulting from the undeveloped Lower Basin Tribal water and withdrawn from TAP.

f) Under the condition shown in Figure 1f shortage occurs with or without TAP water; however, to the extent that releases are greater with TAP water than without, the difference would be added to the tally of shortage reduction attributed to the undeveloped Lower Basin Tribal water and withdrawn from TAP.

At the end of each model run, the tallies of surplus enabling, normal (shortage relief), and shortage reduction water withdrawn from TAP are averaged across all traces for each year of the simulation.

Combinations of these six conditions may also occur, and TAP accounting rules will likely evolve through application. However, the above provides a conceptual overview of how the Ten Tribes Partnership believes the undeveloped Tribal water in the Lower Colorado River Basin should be represented and tracked in order for the DEIS to contain a sufficient ITA analysis of the impacts on Partnership water rights.

20 cont'd at end

III. ANALYSIS OF SURPLUS ALTERNATIVE USING ACCOUNTING CONCEPTS

The Ten Tribes Partnership applied the accounting procedures described above as part of its evaluation of the surplus criteria alternatives described in the DEIS.

The description of the model inputs and configuration details in the DEIS are insufficient to replicate Reclamation's results.[6] Since the proposed accounting procedures require the full detail of the model output, the Partnership made CRSS-ez model runs configured to closely approximate the RiverWare CRSS model results reported in the DEIS.

21 cont'd below

[6] This appears to be a violation of, among other things, NEPA's mandate that environmental impact statements be "supported by evidence that agencies have made the necessary environmental analyses." 40 C.F.R. § 1502.1.

21: See response to Comment No. 71-16. See also Attachment Q which shows the Ten Tribe depletions and diversions that were used in the FEIS alternatives.

An attempt was made to evaluate the Seven States Alternative, *see* 65 Fed.Reg. 42028 (2000), but due to inconsistencies between trigger elevations, demand schedules, post interim criterion (70R versus 75R), and modeling platforms (CRSS-ez versus RiverWare CRSS), results compatible with the DEIS model runs were not obtainable. However, it is believed that the Seven States Alternative would fall between the Six States and California Alternatives, and the Partnership evaluated it accordingly.

The relative magnitudes of the five sources of Lower Basin surplus (storage drawdown, undeveloped Upper Basin Indian and non-Indian water, reduced spills, and reduced evaporation) for each of the surplus alternatives in the DEIS are shown in stacked bar graphs in Figures 2a (annual averages for interim period, 2000-2015), 2b (annual averages for post interim period, 2016-2060), and 2c (annual averages for the entire model study period, 2000-2060).

21 cont'd below

Figure 2a shows that the storage drawdown in Lakes Powell and Mead is the largest source of surplus water to the Lower Basin for all surplus alternatives during the interim period (2000-2015). With the exception of the No Action Alternative, undeveloped water in the Upper Basin is the next largest source of Lower Basin surplus, followed by reduction in spills (excess to Mexico), and then reduced evaporation loss due to the lowering Lakes Powell and Mead.

For the post-interim period (2016-2060), Figure 2b, the average Lower Basin consumptive use is below 7.5 MAF and there is no surplus resulting from changes in storage in Lakes Mead and Powell as these reservoirs were effectively drawn down during the interim period. The No Action Alternative produces the greatest Lower Basin consumptive use during the post-interim period and with less than half the dependency on undeveloped Upper Basin water as the other alternatives.

Figure 2c shows the annual averages over the entire 60-year modeling period. Because the change in storage over the entire modeling period is practically the same for all alternatives it does not figure in to a 60-year average comparison of the alternatives. Figure 2c as well demonstrates that the No Action Alternative has the least reliance on undeveloped Upper Basin water of all the alternatives.

Figures 3a-c provide an analysis, using a top-water accounting method in Lake Mead, of the implicit use of undeveloped Lower Basin Indian water rights by non-Partnership entities. As mentioned earlier, the Lower Basin currently exceeds its 7.5 MAF apportionment despite underdevelopment of Lower Basin Tribal waters rights. Thus the undeveloped Lower Basin Tribal water rights are a basic component of Lower Basin non-Indian use. The Partnership believes that the implicit use of its undeveloped Lower Basin water can best be analyzed through water accounting methods described earlier. For this analysis the Partnership assumed that on average 155 KAF was deposited in the Tribal Accounting Pool (TAP) each year. The 155 KAF is the average undeveloped

Lower Basin depletion right when utilizing the CRSS depletion schedule used in the DEIS during the interim period.

Figure 3a shows a relatively large amount (nearly 80 KAF annually) of TAP water going to realize surplus deliveries (TAP condition shown in Figure 1c) under the California, Six State, and Shortage Protection Alternatives and a modest amount (17 KAF annually under the No Action Alternative during the interim period. Small amounts of TAP water also go to normal (TAP condition shown in Figure 1e) and extreme shortage relief (TAP condition shown in Figure 1f).

21 cont'd

During the post-interim period over 40 KAF annually of TAP water goes to extreme shortage relief and a near equal amount to meet normal deliveries under all surplus alternatives. With exception of the Flood Control Alternative there is little difference in TAP releases among the alternatives during the post-interim period. Note that for the Flood Control Alternative there is never any surplus TAP release (TAP condition shown in Figure 1c) since under this alternative surplus is coincidental with the condition shown in Figure 1a when the TAP is reset.

Figure 3c shows the 60-year average TAP releases. From this figure it is apparent that there is little difference among the liberal criteria (California, Six State, and Shortage Protection Alternatives) with respect to TAP releases and hence to the implicit reliance on undeveloped Lower Basin Tribal waters. The No Action and Flood Control Alternatives have moderately lower 60-year average TAP releases than the three liberal interim criteria.

IV. DISINCENTIVE TO INDIAN WATER DEVELOPMENT

As the DEIS acknowledges but does not analyze (*see* DEIS at 3.14-2), there is a disincentive to Indian water development due to the implicit reliance on undeveloped Tribal water assets. As demonstrated by the accounting above, this implicit reliance varies depending on the surplus criterion. The more liberal the surplus criterion, the greater is the implicit reliance on undeveloped water both in the Upper and Lower Basins, and hence the greater is the disincentive to Indian water development. Since the Lower Basin is over-allocated, the development of Tribal water would reduce the delivery of water to others in the Lower Basin, requiring either a reduction in use or the purchase of water to replace that amount of Tribal water that others have previously used.

22 cont'd below

By assigning per acre-foot dollar values to the Lower Basin non-Indian use of undeveloped Indian waters, we can estimate the economic disincentive to Tribal water development. Using the negotiated cost per acre-foot transferred under the Imperial Irrigation District/San Diego County Water Authority conservation agreement as a current guideline, transferred water is valued at approximately $290/af. Recognizing that the normal and shortage relief releases from TAP would have even greater value, normal

22: The Department does not believe that the proposed action will serve as a disincentive to Indian water development. See response to Comment 53-6.

22 cont'd

TAP releases are valued at $435/af, and shortage relief TAP releases at $580/af. Table 1 gives the results of assigning these values to the implicitly used Upper and Lower Basin undeveloped Tribal waters. The amounts shown represent the 60-year annual average value of the Tribal water that will be used by the Lower Basin non-Indians under the various alternatives. It may be considered a disincentive to the development of Tribal water as those using this water would have to replace it at the approximate values shown, thereby providing this level of disincentive to others to allow for development of the water on Tribal lands. From Table 1 the No Action Alternative results in the lowest economic disincentive to Tribal water development.

Table 1. Potential Economic Disincentive to Tribal Water Development ($million/year).

	California	Six State	Shortage Protection	No Action	Flood Control
Upper Basin	$ 14.24	$ 13.14	$ 14.34	$ 5.50	$ 12.01
Lower Basin	38.24	37.67	38.21	34.26	31.70
Total	$ 52.48	$ 50.81	$ 52.54	$ 39.76	$ 43.71

If the development schedule submitted by the Partnership is utilized in the final EIS as promised in the DEIS, and in a revised DEIS, *see* discussion *supra*, then the water supply available to meet the excess lower basin demand is diminished. When the new model runs are completed for the revised DEIS, the disincentive should be recomputed as the difference in delivery of Lower Basin Tribal water to Lower Basin non-Tribal uses for the two alternatives (full build-out as shown and the schedule shown in the DEIS). While the revised DEIS should recognize the full build out scheduled, it should also acknowledge that the loss of this water to the non-Tribal Lower Basin users has an economic impact and that impact becomes a disincentive for others to allow the Tribes to accomplish their desired build-out.

CONCLUSION

As presently drafted, the DEIS fails to fully and adequately account for the Partnership Tribes' water rights and the impact Reclamation admits the interim surplus criteria will have upon those rights. These failures must be corrected to fulfill the requirements of NEPA and Interior's and Reclamation's own policies regarding ITAs. This additional analysis, together with a complete analysis of the Seven States proposal, will require that Reclamation circulate a revised DEIS that fully accounts for impacts to ITAs and proposes mitigation for those impacts based upon consultation with the Partnership. Without the requisite analysis in a revised DEIS, there is no basis upon which the Partnership – or the Secretary – may support a preferred alternative.

20
cont'd

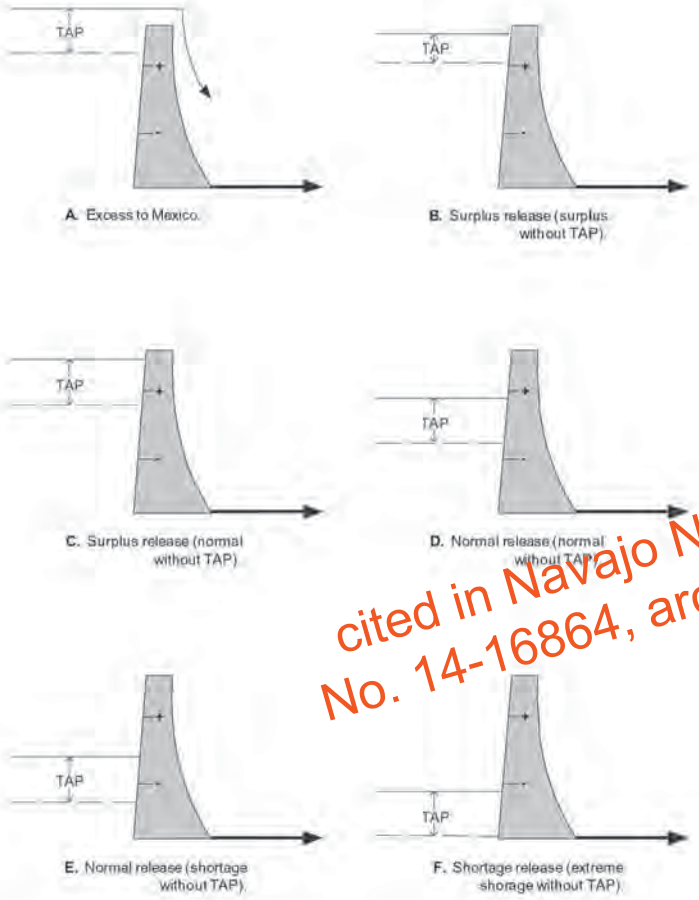


Figure 1. Different combinations of Tribal Accounting Pool (TAP) and contents of Lake Mead relative to surplus (+) and shortage (-) trigger elevations.

TEN TRIBES PARTNERSHIP COMMENTS
COLORADO RIVER INTERIM SURPLUS CRITERIA
DRAFT ENVIRONMENTAL IMPACT STATEMENT

21

21 cont'd

Figure 2a
Interim Period (2000 - 2015) Average Lower Basin Consumptive Use

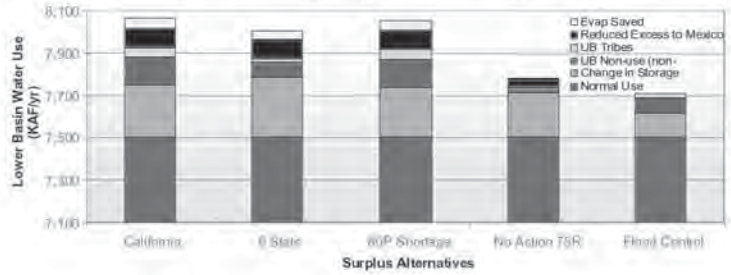
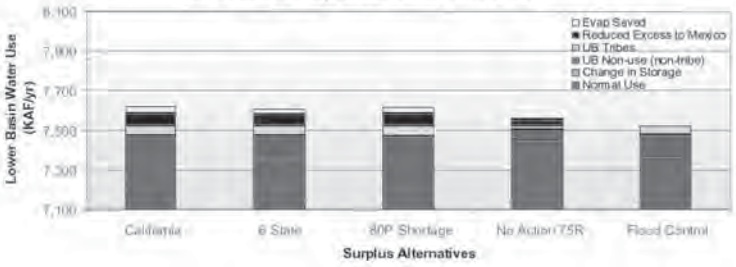


Figure 2b
2016 - 2060 Average Lower Basin Consumptive Use

Figure 2c
2000 - 2060 Average Lower Basin Consumptive



21
cont'd

Figure 3a
Interim (2000 - 2015) Period Average Lower Basin TAP Deliveries

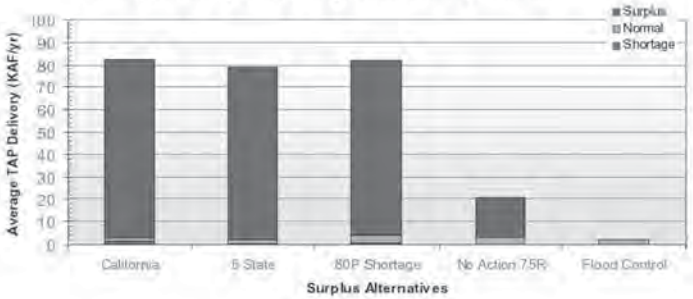
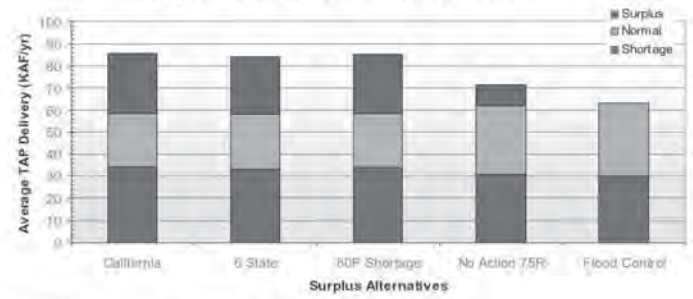


Figure 3b
2016-2060 Average Lower Basin TAP Deliveries

Figure 3c
2000 - 2060 Average Lower Basin TAP Deliveries



TEN TRIBES PARTNERSHIP COMMENTS
COLORADO RIVER INTERIM SURPLUS CRITERIA
DRAFT ENVIRONMENTAL IMPACT STATEMENT

23

INFORMATION SHEET
#71 – Ten Tribes Partnership

The following attachments to the comment letter received from the Nordhaus Law Firm on behalf of the Ten Tribes Partnership (comment letter #71) were not scanned into the database:

(1) Department of the Interior, Departmental Manual release 512 DM 2
Protection of Indian Trust Resources

(2) Bureau of Reclamation, Indian Trust Asset Policy and NEPA Implementing Procedures

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FEDERAL AGENCIES

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way SEP
Sacramento, California 95825

SEP 12 2000
4600

Regional Director
c/o Jayne Harkins, BC00-4600
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

We are writing to provide comments on the draft environmental impact statement (DEIS) for the **Colorado River Interim Surplus Criteria, Colorado River Basin**. It appears that implementation of interim surplus criteria is proposed largely to assist California in the transition to compliance with the basic 4.4 Million Acre Feet apportionment. Accordingly, there should be discussion of potential impacts to California Indian Trust Resources from the DEIS Interim Surplus Criteria Alternatives as associated with the various water management scenarios proposed for the California Colorado River Water Use Plan (4.4 Plan).

1 We are particularly concerned about proposed groundwater recharge/groundwater storage (banking or conjunctive use of Colorado River Water) for tribes in the Salton Sea watershed under the 4.4 Plan as associated with the DEIS surplus alternatives. The DEIS must adequately describe potential adverse impacts to Federal Trust Assets of Indian Reservation water supplies that may become unusable due to the result of groundwater degradation from imported Colorado River water. In addition, the DEIS should include impact scenarios related to reduction of flows to MWD's Colorado River Aqueduct, including description of impacts to the Soboba Indian Reservation and Morongo Indian Reservation.

2 cont'd below Chapters 2 and 3 (Description of Alternatives and Affected Environment & Environmental Consequences, respectively) lack information with respect to the Federal Trust Assets or Resources affiliated with California tribes of the Salton Sea Watershed and the San Luis Rey River Watershed. The San Luis Rey Indian Water Rights Settlement Act of 1988 includes the Five Bands of Mission Indians involved with the Settlement Act, and the water to be delivered to each of the five Indian Reservations associated with the Act, of which source is likely to be diverted and conveyed from the Colorado River. The following Indian Reservations may receive adverse impacts, if not mitigated depending on final Alternative:

1: Metropolitan Water District of Southern California (MWD) and the Coachella Valley Water District (CVWD) have and are currently storing portions of their basic and surplus apportionments of Colorado River water for intrastate purposes. Intrastate storage (e.g. groundwater storage) activities/facilities are not within Reclamation's jurisdiction, and thus does not permit nor follow the water for environmental compliance purposes once delivered to a water user's point of diversion. The federal government does not have jurisdiction over groundwater aquifers, recharge sites or other off-stream storage sites within the states. Ongoing or new groundwater storage projects would be regulated by state and local regulations and compliance requirements under CEQA, California Water Control Board, and the California Department of Health Services. Some groundwater projects may require federal permits or approvals thus a CEQA/NEPA document may be prepared. Potential impact to trust assets on or adjacent to the Soboba Indian Reservation or the Morongo Indian Reservation from the operation and maintenance of MWD's Colorado River aqueduct are the responsibility of MWD and are not caused by or the result of the federal action addressed in this EIS.

2: The Salton Sea Watershed Tribes do not have Winters Rights to Colorado River Water thus there is no trust asset to impact. Potential impacts to Tribal assets from intrastate groundwater storage are not within the jurisdiction of Reclamation but are regulated by state and local regulations. Water to satisfy the San Luis Rey Water Rights Settlement is dependant on and shall be derived from conserved water from the lining of the All American Canal. Once lined, and conservation accounted for, a portion of the conserved water will be transferred by a point of delivery change to MWD facilities which is being addressed by separate Reclamation compliance documentation. Reclamation understands that the BIA is preparing separate environmental compliance for the use of this settlement water. The development nor transfer of the San Luis Settlement water is affected by the federal action addressed in this EIS.

2 cont'd

Salton Sea Watershed Tribes

- Agua Caliente Band of Cahuilla Indians,
- Augustine band of Mission Indians,
- Cabezon band of Mission Indians,
- Morongo Band of Mission Indians,
- Torres-Martinez Desert Cahuilla Indians,
- Twenty-Nine Palms Band of Mission Indians;

San Luis Rey River Watershed Tribes

- La Jolla Band of Mission Indians,
- Rincon Band of Mission Indians,
- Pauma-Yuima Band of Mission Indians,
- Pala Band of Mission Indians,
- San Pasqual Band of Mission Indians.

3

The Distribution List does not indicate that BIA Southern California Agency (Riverside) was provided a copy of the DEIS. Reclamation did not include the BIA Pacific Regional Office in the initial distribution of the DEIS. This comment constitutes at least the 7th time your office has been notified to provide copies of NEPA-related notices and environmental documents to these offices.

If you have any questions concerning our request or need additional information, please contact William Allan, Regional Environmental Protection Specialist, at (916) 978-5062, or Dale Morris, Regional Natural Resources Officer at 978-6051.

Sincerely,

Regional Director

cc: Regional Environmental Officer, Office of Environmental Policy and Compliance
Superintendent, Southern California Agency
Director, Palm Springs Field Office

3: The Riverside office of BIA was sent a copy of the FEIS, as requested. As a commentor, the Pacific Regional Office was added to the distribution list.

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
NAVAJO REGION
P. O. Box 1060
Gallup, New Mexico 87305-1060

IN REPLY REFER TO:

RRES/520

SEP 2 1 2000

9/25 Hanks 4600

Ms. Jayne Harkins
Bureau of Reclamation
Attention: BCC00-4601
P. O. Box 61470
Boulder City, Nevada 89006-1470

Dear Ms. Harkins:

On behalf of the Navajo Nation, the Bureau of Indian Affairs, Navajo Region, is providing comments on the *Colorado River Interim Surplus Criteria Draft Environmental Impact Statement* (DEIS). We have reviewed the DEIS relating especially to water quantity and water quality and are providing several comments as included below.

1. The DEIS does not consider the unquantified water rights of the Navajo Nation and the other Arizona Mainstream Tribes above Lake Mead. If tribes are allocated Colorado River water, the amount of water available to the Central Arizona Project would be diminished, affecting all the surplus criteria. Because the DEIS does not analyze the impacts attributable to the various surplus criteria on the ability of the Arizona Mainstream Tribes above Lake Mead to obtain Colorado River allocations, the Indian Trust Asset analysis is deficient for these tribes.

2. Although the DEIS states that interim surplus criteria would be implemented for 15 years, it assesses effects of the criteria for 50 years. After the 15-year period, all alternatives revert to baseline conditions, which is only one of the alternatives. Why do you assess effects for only one of the alternatives for 50 years? It is more appropriate if the final environmental impact statement (FEIS) provided some analysis of the effect of continuing the various alternatives throughout the 50-year period.

3. The DEIS provides information on the effects of water level changes on recreation facilities (marinas) in Lake Powell and Lake Mead caused by interim surplus criteria by quantifying the costs associated with facility adjustment and capitol acquisition both incrementally and over the 15-year period. Total costs for the entire 15-year period for the 10, 50 and 90 percent hydrologic inflow projections should be quantified in the FEIS.

1: See response to Comment 53-5.

2: See response to Comment 59-2.

3: It is recognized that different percentiles could be used for presenting the information in Section 3.9.6, however, Reclamation believes that using median elevations appropriately presents the differences between the alternatives and baseleine conditions. It should be noted that using 90th percentile elevations would show no discernable differences between the alternatives and baseline conditions for Lake Powell or Lake Mead, and use of the 10th percentile elevations would indicate differences similar to those identified using the median elevations (see FEIS Figures 3.9.1 and 3.9.4).

4 5 6 While the DEIS suggests that one or more marina sites could become inoperable at certain unspecified water levels, no analysis of these critical levels is provided. The effects of the marina closures could have broad economic consequences to the local and regional economy including that of the Navajo Nation. The effect of the closures of marinas on the ability of the concessionaire to make a profit should be analyzed. The Navajo Nation plans on opening a new facility at Antelope Point on Lake Powell. The ability of the Navajo Nation to open and operate a new facility at Antelope Point on Lake Powell should be analyzed and discussed in the FEIS.

7 3. Water quality is an issue in the DEIS since lake water levels and related lake volume are critical factors in predicting overall water quality. Existing contaminants in the lake will be more diluted if there is more volume in the lake. A general summary of the chemical and pollutant characteristics of the lake is provided in the DEIS, but no specific projections are given on how these concentrations would change with various lake levels. Because the limnology and water quality of Lake Mead are generally known, predictions about changes could be developed and appropriately included in the FEIS.

We appreciate the opportunity to comment on the draft EIS. If you have any questions or comments, please contact Jane Farris, Supervisory Hydrologist, at 505-863-8214.

Sincerely,

Acting Regional Director, Navajo

cc: Stanley Pollack, Navajo Nation Department of Justice – Window Rock, Arizona
John Leeper, Navajo Nation Water Management Branch – Ft. Defiance, Arizona
Leonard Robbins, Navajo Region – Environmental
Tom Hemstreet, Navajo Region – Tribal Services

4: The discussion of threshold elevations, particularly for Antelope Point Marina, has been expanded. See Section 3.9.2.2.2 for a description of the elevations and Section 3.9.2.3.1 for an analysis of threshold elevations.

5: Potential costs incurred from relocating marina facilities are addressed in Section 3.9.6. Section 3.2 states that the scope of the analysis at Lake Powell is limited to the maximum water surface elevation; regional economic effects are not analyzed. As shown in Figure 3.9-6, the probabilities of Lake Powell elevation falling below 3626 feet msl (the approximate bottom elevation of future boat ramp useability under baseline conditions and the preferred (Basin States) alternative) are typically within 5 percent of each other.

6: Due to the small difference in probabilities (discussed above) between the baseline conditions and preferred alternative, interim surplus criteria would not have a significant effect on the feasibility of a marina at Antelope Point. Reclamation is providing information to the Navajo Nation as requested, regarding results of analyses significant to Antelope Point.

7: The water quality analysis in the EIS appropriately identifies the potential effects of interim surplus criteria. Potential effects are discussed in terms of the general effects of changing reservoir elevations because specific elevations and periods that such elevations would occur are unknown and cannot be predicted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 8, 2000

Robert W. Johnson, Regional Director
c/o Jayne Harkins, BC00-4600
Bureau of Reclamation
Lower Colorado River Region
Boulder Canyon Operations Office
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Mr. Johnson:

The Environmental Protection Agency (EPA) has reviewed the draft environmental impact statement (DEIS) for the **Colorado River Interim Surplus Criteria, Colorado River Basin** (CEQ #239). Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The Secretary of the US Department of the Interior (Secretary), acting through the US Bureau of Reclamation (Reclamation), is considering the adoption of specific interim criteria under which surplus water conditions may be declared on the Lower Colorado River Basin during an interim period that would extend through 2015. The interim surplus criteria would be subject to five-year reviews concurrent with the Long-Range Operating Criteria (LROC) reviews, and applied each year as part of the Annual Operating Plan (AOP). To date the Secretary has applied factors, including but not limited to the LROC, in annual determinations of the availability of surplus quantities of water for pumping or release from Lake Mead.

For many years, California has been diverting more than its 4.4 maf apportionment from the Colorado River. Prior to 1996, California drew on unused apportionments of other Lower Division states made available by the Secretary. Since 1996, California has also drawn on surplus water made available by Secretarial determination. California is in the process of developing the means to reduce its annual use of Colorado River water to 4.4 maf (4.4 Plan). Adoption of specific interim surplus criteria would afford mainstream users of Colorado River water, particularly users in California who currently utilize surplus flows, a greater degree of predictability with respect to the likely existence, or lack thereof, of surplus conditions on the river in a given year. Thus, interim surplus criteria would accommodate implementation of California's 4.4 Plan and ease California's transition to living within its basic 4.4 maf apportionment.

The DEIS considers four interim surplus criteria alternatives as well as a No Action Alternative (baseline). The four surplus criteria alternatives considered are the Flood Control Alternative, Six States Alternative, California Alternative, and Shortage Protection Alternative. In addition, another alternative was announced in the August 8, 2000 Federal Register (Volume 65, Number 153, pages 48531- 48538), herein named the Seven States Consensus Alternative. This alternative is judged by Reclamation to be within the range of the four alternatives evaluated in the DEIS. All alternatives propose Lake Mead water surface elevations which would be used for determining the availability of surplus water through 2015. The Flood Control Alternative is the most conservative, even more than baseline, whereby a surplus condition is determined only when flood control releases from Lake Mead are required. Flood control releases occur only when Lake Mead is near a full condition. The Shortage Protection Alternative is the least conservative since surplus conditions are determined when Lake Mead surface water elevations are relatively low, thus providing for more frequent probability of surplus determinations. The Six States, California, and Seven States Consensus alternatives provide for tiered elevation criteria which could be tied to specific uses of the surplus water. A preferred alternative has not been identified.

The analysis presented in the DEIS is based on a computer model of the operation of the Colorado River system under baseline conditions and the four surplus criteria alternatives. Attributes modeled were Lake Mead and Lake Powell surface water elevations and Lower Colorado River flows from 2000 - 2050. In general, model results for all alternatives, including baseline, indicate that Lake Mead surface elevations are likely to decline over the 50-year period of analysis. This decline is attributed to increasing Upper Basin depletions. The proposed surplus criteria alternatives would increase the rate and magnitude of decline in Lake Mead surface elevations. Since Lake Mead carryover storage helps minimize water supply shortages during dry periods, a reduction in its surface elevation and associated volume could also increase the probable frequency and magnitude of shortages to Lower Basin States and Mexico.

EPA commends Reclamation and the seven basin states for their thoughtful efforts to address the growing need for water supply in the Lower Colorado River Basin. The reduction of unused apportionment and increased development in both the upper and lower basins, clearly demonstrate the potential for significant water scarcity and the need for long-term strategies to address future shortages. In that, EPA advocates operation of the Colorado River system in a way which will provide flexibility to accommodate future shifts in water policy and assure a long-term, sustainable balance between available water supplies, ecosystem health (e.g., in-stream beneficial uses), and water contract commitments. To help provide this flexibility, we urge Reclamation to utilize all available tools for enhancing water management flexibility, supply reliability, and water quality. These tools could include water transfers and exchanges, conservation, pricing, irrigation efficiencies, operational flexibilities, market-based incentives, water acquisition, conjunctive use, voluntary temporary or permanent land fallowing, and wastewater reclamation and recycling. Within the context of interim surplus criteria, we believe the surplus determination should include more specific requirements, such as conservation measures, for efficient and beneficial use of the surplus water. 1

We strongly support California's reduction of its use of Colorado River water down to its basic 4.4 maf apportionment and acknowledge the need for interim surplus criteria to help ease California's transition. On-the-other hand, interim surplus criteria could incrementally increase 2

1: Comment noted.

2: Comment noted.

3 the decline of Lake Mead surface water elevations and the probability of more frequent and higher magnitude water shortages to other users of Lower Colorado River water. These effects would contribute to incremental adverse impacts to water supply availability, water quality, hydropower generation, and recreational facilities. Adequate water supply for the Central Arizona Project (CAP) could be significantly reduced since it has the lowest priority water rights. Thus, the CAP would be the first to experience shortages and could be reduced to zero allocation prior to shortages for other higher priority users. In addition, the probable release of surplus and excess flows to Mexico and the Colorado River delta would be significantly reduced to near zero, especially during the 15 year interim period. Thus, the proposed criteria could impact a wide range of water users, and because of that, we are concerned that there is little evaluation of indirect impacts and of mitigation measures for direct, indirect, and cumulative effects.

4 While the DEIS provides a good evaluation of potential direct impacts, the scope of the analysis is limited to the 100-year flood plain and reservoir maximum water surface elevations (pg. 3.2-1). Therefore, indirect impacts caused by use and storage of the surplus water are not addressed. This is of concern because proposed use of surplus water includes groundwater banking in basins that are extremely controversial and/or have not been adjudicated and which do not provide protection for existing users (e.g., Desert/Coachella Basin, Cadiz). In addition, a number of Indian Tribes and their Indian trust assets could be adversely affected by proposed storage actions.

5 We are also concerned by the minimal consideration, description or evaluation of mitigation for identified potential impacts. Although the direct impacts may be an incremental increase above baseline, we strongly believe Reclamation has an obligation to describe and consider mitigation for these impacts. Mitigation for potential increased CAP shortages is of

6 concern, especially for Indian Tribes who have unquantified or outstanding water rights (e.g. Hualapai Tribe) or are dependent on CAP water. The FEIS should describe and consider mitigation for potential impacts on all potentially affected Indian Tribes (CAP and non-CAP Tribes), CAP users, and others who may be interested in CAP water. As stated in the DEIS, Reclamation has an obligation to protect Indian trust assets from adverse impacts resulting from its programs (pg. 3.14-1). Furthermore, in the interest of international cooperation, Reclamation

7 should address the mitigation concerns of Mexico per their request (Attachment Q). The FEIS should describe mitigation options and who would fund and implement them. We note that CEQ regulations state that the EIS should include the "means to mitigate adverse environmental effects." (40 CFR 1502.16(h)).

8 Because of the above significant concerns, we have rated the proposed alternatives and DEIS as EC-2, Environmental Concerns - Insufficient Information (see attached "Summary of the EPA Rating System"). We trust that these comments will assist you in improving the document so that you can move forward with this important action. We urge adoption of a conservative and protective alternative which would maximize long-term operational flexibility, minimize the risk of more frequent and higher magnitude shortages, and ensure aggressive implementation of California's 4.4 Plan.

3: Potential effects on water supply to the lower Basin states, Indian Tribes, and Mexico; water quality; hydropower production; and recreational facilities are discussed in the EIS. Determining the effects on individual water users is beyond the scope of the EIS. Flows to Mexico and potential transboundary effects are discussed in Section 3.16.

4: Because the proposed action is implementation of interim surplus criteria (surplus has and will be delivered under the No Action Alternative/AOP), Reclamation has determined that analysis of potential indirect effects associated with the use of Colorado River water is outside of the area of potential effect as defined in the EIS and is not within the purview of Reclamation's Federal action or the NEPA process being conducted for interim surplus criteria. The indirect effects analysis from the use of any Colorado River apportionment is the responsibility of the California parties and any other state users. It should be noted that California's Colorado River depletion has been 600-800 kaf over their 4.4 apportionment for a number of years. This demand has been met historically through unused apportionment and surplus deliveries.

5: No significant impacts have been identified that require specific mitigation. However, Section 3.17 has been added to the FEIS to discuss environmental commitments that Reclamation would commit upon adoption of interim surplus criteria through the Secretary's Record of Decision.

6: The CAP master contract, through which the Tribes receive water has no guarantee of the availability of water. The Department is of the opinion that the trust asset in this case is the contract the Tribes have for delivery of CAP water. This contract has fully disclosed the potential diminishment of the water. The EIS, in Section 3.14.3 has fully disclosed the impacts of this action to the delivery of CAP water.

7: Potential effects in Mexico will be addressed through continued coordination with Mexico.

8: Comment noted.

We appreciate the opportunity to review this DEIS. Please send three (3) copies of the Final environmental impact statement to this office at the same time it is officially filed with our HQ Office of Federal Activities. If you have any questions, please call Laura Fujii, of my staff, at 415-744-1601, email: fujii.laura@epa.gov.

Sincerely,

Deanna Wieman
Deputy Director
Cross Media Division

File: intercri.wpd
Main ID# 003345
Enclosure: Detailed Comments (8 pages)
Summary of the EPA Rating System

cc: Patricia Port, Office of Environmental Affairs, US Department of Interior
US Fish & Wildlife Service, Arizona and California Ecological Services Field Office
US Geological Survey, Water Resources Division, Yuma, AZ
Bureau of Indian Affairs, Phoenix Area Office
US IBWC, Environmental Management Division
Charles Keene, CA DWR

DEIS COMMENTS, BOR, INTERIM SURPLUS CRITERIA, SEPT. 2000

DETAILED COMMENTS

ENVIRONMENTAL ANALYSIS

Indirect and Cumulative Impacts

9 1. The implementation of interim surplus criteria releases are key to the implementation of California's 4.4 Plan and its transition down to its basic Colorado River apportionment. California would receive surplus water which it can store for future use when surplus is not available and prior to achieving its 4.4 maf demand goal. The FEIS should fully evaluate the potential indirect and cumulative impacts of storage and use of surplus water obtained pursuant to the interim surplus criteria.

10 2. One tool which California could use to store surplus water is provided by Reclamation's Off-Stream Storage Rule. This rule allows storage and transfer of water between lower Basin States. The DEIS does not mention the Off-Stream Storage Rule or how it relates to interim surplus criteria and implementation of California's 4.4 Plan. The FEIS should describe the Off-Stream Storage Rule, its role in water management of the Lower Basin States, and potential indirect and cumulative impacts of storage of surplus water pursuant to this Rule. Of specific concern are potential effects to Tribal Trust lands especially where there is a shared aquifer that is not adjudicated.

11 3. It is our understanding that surplus water allocated to California could be used for groundwater banking within the Cadiz Basin, Hayfield/Chuckwalla Basin, and Desert/Coachella Basin. While these groundwater basins may already be used for water banking, the potential increase in surplus water could significantly affect their management and future use. Furthermore, there is a significant concern regarding potential adverse effects to groundwater quality from the injection of lower quality Colorado River water. The FEIS should fully evaluate potential indirect and cumulative impacts of storage of surplus water in these groundwater basins. In addition, the FEIS should describe management of these groundwater basins, for example, storage criteria, extraction of stored surplus water, and protections for users of a shared aquifer.

General Environmental Analysis Comments

12 1. The environmental analysis is based upon computer models simulating potential future Lake Mead and Lake Powell surface elevations and flows in the Lower Colorado River. Many model assumptions are made (pg. 3.3-9). Given the large number of assumptions, the FEIS should include sensitivity analyses for those parameters which may be especially vulnerable to slight changes in assumptions, e.g. fisheries and sensitive species. Parameters which may be of

1

9: The direct, indirect, and cumulative effects of the interim surplus criteria alternatives were analyzed within the project area, which extends from the upper reaches of Lake Powell to the Southerly International Boundary with Mexico within the 100-year floodplain. Off-river effects of storage and use of surplus water have been or are being addressed in existing or ongoing NEPA and/or California Environmental Quality Act and California Endangered Species Act compliance documents as appropriate. These activities are authorized by state actions. These include the Quantification Settlement Agreement PEIR, Secretarial Implementation Agreement EA, IID/SDCWA Transfer EIS/EIR, and the San Diego County HCP. The federal government does not have jurisdiction over groundwater aquifers, recharge sites or other off-stream storage sites within the States.

10: The Rule would establish the procedural framework for the Secretary to follow in considering, participating in, and administering Storage and Interstate Release Agreements (SIRA). The Rule establishes a framework only and does not authorize any specific activities. The Rule is based on the understanding that this type of offstream storage is a beneficial use of Colorado River water. To date no SIRA have been received by Reclamation for review and approval. California, specifically MWD, has voiced interested in interstate storage in Arizona. However, the quantity of water for storage and retrieval is substantially in excess of what is permitted by law for the Arizona Water Banking Authority. MWD's schedule for storage and retrieval also does not comply with Arizona State law. It is unknown if MWD would revise its proposed storage and retrieval quantities and schedule to meet Arizona law or if Arizona would amend its law. It is highly speculative if interstate banking under the Rule would benefit MWD considering MWD's development of its own storage facilities for intrastate storage purposes. It should be noted that California entities have and are presently storing portions of their basic and surplus apportionments for intrastate purposes. Interim surplus is unlikely to vary in quantity or quality from surplus Colorado River water already delivered. Intrastate storage activities/facilities are not within Reclamation's jurisdiction but are regulated by state and local regulations and compliance requirements under the California Environmental Quality Act (CEQA). Some groundwater projects may require Federal permits or approvals thus a joint CEQA/NEPA may be prepared for the Cadiz, Hayfield/Chuckwalla , and Desert/Coachella projects. A draft EIR/EIS and Supplement for the Cadiz project has been published. Environmental documents for the latter two projects are in progress.

11: Comment noted. See response to Comment 56-10.

12: The FEIS includes sensitivity analyses related to California intrastate transfers and the Lake Mead elevation at which shortage is declared.

cont'd | critical concern to the Basin States, such as level of water supply depletions during shortages, should also be considered for sensitivity to different model assumptions.

13 | 2. The DEIS states that interim surplus criteria alternatives are not expected to affect flows in the Colorado River between Glen Canyon Dam and Lake Mead because it is assumed flow release patterns would be determined by the Glen Canyon Adaptive Management Program pursuant to the Glen Canyon Dam Operations Record of Decision (ROD) (pg. 3.2-5, 3.9-33). Although the Glen Canyon Adaptive Management Program would still be in effect, the timing and magnitude of releases from Glen Canyon Dam could be influenced by interim surplus criteria and subsequent equalization requirements between Lake Powell and Lake Mead. We note that even slight changes in flows can significantly alter the configuration of whitewater rapids within the Grand Canyon changing the level of risk and safety. The FEIS should include a summary of the Glen Canyon Dam Operations ROD and additional data supporting the assumption of no affect on river flows.

14 |

WATER NEEDS ASSESSMENT

15 | EPA has concerns with both the assumptions and calculation methods for water needs projections. The DEIS appears to use water supply projections provided by the States. It is not clear whether Reclamation has evaluated these projections to determine whether they are fully protective of beneficial uses, ensure efficient use of water, and integrate aggressive water conservation and demand management. We recommend the FEIS describe the process used by the States to derive their water supply projections and whether these methods assure that water would not go to waste, go to environmentally harmful areas, or hinder achieving water quality objectives within the scope of applicable state water law.

TRANSBOUNDARY EFFECTS

16 | 1. Interim surplus criteria could reduce by up to 37% the frequency of Mexico receiving surplus water (pg. S-14, Section 3.16). The release of excess flood flows could also decrease. The lower frequency of surplus water and excess flood flows to Mexico could significantly reduce the amount of flows reaching the Colorado River Delta (Delta). Historically, the Delta was an extensive and rich wetland area of significant cultural and economic importance to the Cocopah Indian Tribe and other Mexicans of the Gulf of California. Already greatly depleted and only recently partially revived by excess flood flows, further reduction of Colorado River flows could have adverse effects on Delta wetlands and hinder efforts to restore this area.

We urge Reclamation to actively work with Mexico, the International Boundary and Water Commission (IBWC), States, Federal agencies and other stakeholders in restoration of the Delta region. We understand that such a process is under development. We would like to be

13: The Bureau has determined that the Adaptive Management Program will protect whitewater boating opportunities in the Colorado River between Lake Powell and Lake Mead in compliance with the Grand Canyon Protection Act. Therefore, the interim surplus criteria would not adversely affect whitewater boating opportunities in the Colorado River. The Grand Canyon Protection Act directs the Secretary, among others, to operate Glen Canyon Dam in accordance with the additional criteria and operating plans specified in section 1804 of the Act and to exercise other authorities under existing law in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to the natural and cultural resources and visitor use. The Glen Canyon Dam Adaptive Management Program (AMP) was established as a Federal Advisory Committee to assist the Secretary of the Interior in implementing the Grand Canyon Protection Act. We agree that interim surplus criteria could have an influence on releases from Glen Canyon Dam; however, releases will continue to be governed by the criteria in the Record of Decision which was developed in full consideration of both the safety and quality of recreational experiences in Glen and Grand Canyons. A summary of the Glen Canyon Dam Record of Decision has been included as Appendix D of this document.

14: The ROD for the Operation of the Glen Canyon Dam is included as Attachment D. Pertinent information from it is summarized in various sections throughout the FEIS. The section on river flows (3.6) identifies that the action alternatives would have an effect on the frequency of Beach/Habitat-Building Flows and Low Steady Summer Flows.

15: Reclamation does not review and independently change the Tribes and States water supply projections, though Reclamation staff has some understanding of the calculation methods used. See response to Comment 56-29 of this letter for a complete description of Reclamation's process for assuring the beneficial use of Colorado River water.

16: The delivery of water to Mexico under all modeled conditions in this FEIS were consistant with the requirements of the Treaty. The diversion and use of such Treaty water is solely at Mexico's discretion. The delivery of excess flows to Mexico occurs when available flows in the Colorado River exceeds that amount that is necessary to meet the beneficial needs and uses of Lower Basin users in the United States. It is not within Reclamation's discretionary authority to make unilateral adjustments to water deliveries to the international border. Also, as mentioned in response to Comment 56-7, potential effects on habitat and special status species along the river in Mexico and efforts to restore the Delta are being addressed through continued coordination with Mexico. The Executive Order on Environmental Effects Abroad, as discussed by section 3.16.2, focuses on impacts to natural resources, and specifically excludes consideration of socioeconomic impacts.

cont'd active participants in this process. When appropriate, please contact Catherine Kuhlman of our Water Division at 415-744-2001, regarding upcoming meetings and forums. Per Mexico's request (Attachment Q), the FEIS should describe mitigation for possible transboundary impacts and means to address the concerns of Mexico. Potential indirect and cumulative impacts to the Cocopah Indian Tribe and Mexican residents of the Gulf (e.g., shrimp fisherman) should also be acknowledged and described in the FEIS.

17 2. Describe in the FEIS what water is used to satisfy the 1.5 maf allocation to Mexico. Is this water part of the 7.5 maf allocated to the Lower Basin States? Is it taken from unused Lower Basin States' apportionment? or Is this water taken equally from the upper and lower basins? Describe where this water would come from under shortage conditions.

WATER QUALITY

18 1. The DEIS appears to address only salinity (total dissolved solids) and potential impacts to the Southern Nevada Water Authority (SNWA) drinking water intakes in Lake Mead. EPA is significantly concerned with the potential impacts of interim surplus criteria on perchlorate, nutrients, and mercury in fish tissue. It is clear that Lake Mead surface elevation and volume would decrease thus reducing dilution effects and potentially changing contaminant movement from Las Vegas Wash and within Las Vegas Bay (Section 3.5). The FEIS should evaluate the potential direct, indirect, and cumulative effects of interim surplus criteria on the concentration and movement of perchlorate, nutrients, mercury and other heavy metals within Lake Mead and downstream. Modeling and monitoring of these contaminants and projected downstream flows may be needed. Amounts of mercury and other heavy metals in fish tissue should be described more accurately. These contaminants are of grave concern because of their potential adverse health effects.

19 2. Perchlorate contamination is already known to travel down to the international border. Thus, the FEIS should evaluate potential contaminant impacts to drinking water intakes below Lake Mead. Of special interest are the intakes for MWD's California Aqueduct, especially since the interim surplus criteria will be providing more water for MWD.

20 3. Lower Lake Mead surface elevations could result in a reduction in water quality from tributaries (pg. 3.5-22). The reduced water quality is a result of longer channels, more evaporation and heating, and the resulting greater concentration of contaminants. The DEIS states that this adverse effect may be offset by the development of riparian habitat at the mouths of the tributaries which would help filter the water. If this is the case, Reclamation should consider sponsoring efforts to restore tributary wetlands as mitigation for reduced water quality. For example, there is a major effort to restore the historical wetlands of Las Vegas Wash which Reclamation could actively support.

17: The U.S.-Mexico Treaty of 1944 guarantees an annual quantity of 1.5 maf to Mexico. This quantity is a scheduled delivery from Lake Mead, in addition to the 7.5 maf allocated to the Lower Division states. The Colorado River Compact of 1922 stated that if this right was recognized, the water would be supplied by water over and above the Basin States apportionment of 16 maf, and that if such water was insufficent, any deficiency would be borne equally by the upper and lower basin. Under shortage conditions, Article 10 (b) of the Treaty states "in the event of extraordinary drought or serious accident to the irrigation system in the United States....the water allotted to Mexico....will be reduced in the same proportion as consumptive uses in the United States are reduced."

18: Comment noted. Additional information regarding contaminants has been added to Section 3.5 of the FEIS.

19: Through a 1999 consent agreement with the Nevada Department of Environmental Protection, remediation of perchlorate in groundwater entering Las Vegas Wash and Lake Mead will continue into the future which will reduce the concentration of perchlorate down river, at the MWD intake, and below this point. It is expected that the California standard of 18 ppb for drinking water will not be exceeded but reduced in Colorado River water through time. See also response to Comment 56-18.

20: Reclamation is a partner in the Las Vegas Wetland Restoration program and other programs around Lake Mead and along the Lower Colorado River.

ALTERNATIVES ANALYSIS

Seven States Consensus Alternative

1. Since the alternative announced in the August 8, 2000 Federal Register (Volume 65, Number 153, pages 48531- 48538) appears to represent a consensus agreement between the seven basin states, we anticipate the selection of this alternative as the preferred alternative in the FEIS. As such, we urge Reclamation to provide a full description and environmental evaluation of this alternative in the FEIS. While this alternative may be within the range of the alternatives evaluated in the DEIS, we believe it is important to include a full evaluation of its potential effects in the FEIS to provide a clear comparison with other proposed alternatives. This comparison is of special interest because the Seven States Consensus alternative appears to propose significantly more complex criteria and a shortage determination elevation well below existing management triggers or those proposed by the other alternatives.

21

As stated, the Seven States Consensus Alternative appears to propose a shortage determination criteria of 20% or greater probability of going below a Lake Mead surface elevation of 1050 msl. This shortage criteria is of significant concern because it is well below the minimum elevation level required for power generation (1083 msl). In addition, reduction of Lake Mead surface elevations below 1050 msl could have significant adverse effects to recreation, water quality, and future water supplies.

2. Give the close link between interim surplus criteria and transition of California down to its 4.4 maf basic apportionment, we are pleased with the proposed review of progress in implementation of California's 4.4 Plan and the specific California water conservation targets set out in the Seven States Consensus Alternative.

3. The Seven States Consensus Alternative includes a commitment by the Metropolitan Water District (MWD) to reparation to Arizona for increased water supply shortages. This reparation would be by MWD agreement to forbear the delivery of a specific quantity of Colorado River water. It appears that the water which would be foregone by MWD would be Priorities 6 and 7 water. The FEIS should describe how this reparation would work, especially in the likely shortage years when water may not be sufficient to provide for priorities 6 and 7 water.

General Alternatives Analysis Comments

1. We strongly recommend anticipated storage and use options for the surplus water be described (e.g., groundwater banks, storage reservoirs, recharge basins). Although these options may already be in use, water available pursuant to interim surplus criteria could significantly modify the management of these facilities and the rate and magnitude of indirect effects.

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21: The preferred alternative in this FEIS was derived from the draft Seven States Proposal, and was evaluated at the same degree of detail as the other alternatives. Reclamation did not structure the preferred alternative precisely as described in that draft proposal, but made some changes for consistency with the purpose and need of the proposed action, Reclamation policy and operational procedures. The proposed shortage determination criteria were not included in the preferred alternative. Reclamation regards California's proposed reparation to Arizona for increased shortages as a matter between California and Arizona, and has not included the reparation in this FEIS. The Secretary intends to honor reparation agreements among various entities.

22: Reclamation does not federalize intrastate uses of Colorado River water and does not follow the water for environmental compliance purposes once delivered to a water user's point of diversion. The federal government does not have jurisdiction over groundwater aquifers, recharge sites or other off-stream storage sites within the States. Those activities are authorized by state and local actions. Other federal permits and environmental compliance may be required for specific facilities on a case by case basis. See also response to Comment 56-10.

DEIS COMMENTS, BOR, INTERIM SURPLUS CRITERIA, SEPT. 2000

23 2. The DEIS states that the Flood Control Alternative conditions were modeled with the assumption that California's 4.4 Plan was not implemented (pg. 3.3-9). The FEIS should describe the rationale for this modeling assumption. Was the assumption made that the 4.4 Plan would not be implemented because the probability of surplus determinations under the Flood Control Alternative is even lower than baseline?

24 3. While other Lower Basin States may receive less than their full apportionment under shortage conditions, the DEIS appears to assume that California would never receive less than 4.4 maf/year (pg. 3.4-20). Is this assumption made because 4.4 maf is already considered a shortage condition for California? Is this assumption valid? Are there conditions under which California may be unable to receive its full basic apportionment?

25 4. Instead of referring to Attachment G, Lower Division Depletion Schedule and H, Draft Interim Surplus Guidelines; we suggest the description of alternatives include a summary of the information provided in these attachments. For example, describe the percentage of years that water transfers would occur to California under Tier 2 of the Six States Alternative versus just referencing Attachment G. The alternative descriptions should also include specific information on the water use restrictions which would apply for each surplus criteria tier. For instance, what types of storage and use would be acceptable for surplus water obtained during a Partial Domestic Surplus year pursuant to the Seven States Consensus alternative?

26 5. The FEIS should also provide short narratives explaining how the Lower Division Depletion Schedule (Attachment G) and Draft Interim Surplus Guidelines (Attachment H) would be interpreted. How would the Guidelines work if different surface elevation levels are triggered in different years? For example, if surplus is declared under Tier 3 of the Six States Alternative in 2002, what would be the amount of surplus released in year 2005 if surplus were declared under Tier 2 in 2005? Providing a simple example of how the Guidelines would be implemented would be helpful.

27 There is a similar risk of confusion regarding the California Alternative. This alternative appears to trigger surplus determination based on a prediction of what surface elevation levels would be achieved in the year 2015. For instance, what surplus would occur if 2015 surface elevations are at 1166 msl and 2001 surface elevations are at or above 1098 msl?

MONITORING AND ADMINISTRATION

1. A key objective of interim surplus criteria is to provide MWD surplus water, when available, to meet direct water supply demands while California's 4.4 Plan programs and projects are implemented, as well as to provide a source of water for conjunctive use and storage programs (pg. 12 August 8, 2000 Federal Register Notice on Seven States Consensus

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23: Implementation of the California Plan and intrastate transfers was included in the FEIS Flood Control alternative. See response to Comment 37-11 for more details.

24: Shortage conditions for the Colorado River have not been defined. They were assumed for modeling purposes in the EIS. Section 3.3.3.4 describes the Lake Mead water level protection assumptions and the modeling conditions under which California could receive less than its normal apportionment.

25: See Attachment H for additional information.

26: Additional discussion has been added to the Lower Division Demand Schedules (FEIS Att. H) regarding the influence on surplus water deliveries. The guidelines (FEIS Att. I) would be applied annually to whatever water surface elevation existed.

27: The surplus triggers would be used once a year to determine whether surplus conditions would occur in the following year. For example, in August 2007, while preparing the AOP for 2008, Reclamation would project the January 1, 2008 Lake Mead elevation using our 24 month study (2 year model). If the water surface elevation of Lake Mead were projected to be above approximately 1163 ft, the surplus volume stipulated for Tier 1 for 2008 would be triggered for delivery during 2008, regardless of the resulting lake level within year 2008. The monthly delivery to each Lower Division state would be according to its monthly surplus water demand schedule for Tier 1. In addition, the amount of surplus water allowed for delivery in 2008 would be subject to a determination of beneficial use by the Regional Director, Lower Colorado Region.

28 Alternative). Therefore, Reclamation states that failure of California to carry out the 4.4 Plan may result in termination or suspended application of the 15-year interim surplus criteria (pg. 1-22). A condition of interim surplus criteria continuation would be a showing of satisfactory progress in implementing the 4.4 Plan. The FEIS should provide more details on how "satisfactory progress" would be defined and measured. For example, describe how water conservation will be interpreted, monitored, and accounted for under California's 4.4 Plan.

29 2. The FEIS should also describe how surplus water would be monitored and measured. Effective and sustainable management of water supplies depends on an accurate knowledge of water supply availability and water use. This knowledge can only be obtained through monitoring and accounting of water supply and use. We urge Reclamation to make a firm commitment to timely and accurate monitoring and accounting of the surplus water depletions. We recommend a monitoring and accounting plan be included in the FEIS.

30 3. Attachment D Surplus Criteria Proposal by Six States includes a section requesting a commitment by Reclamation to move forward with its identification of Lower Basin water users who are either exceeding contract entitlements or are diverting water without a contract. Furthermore, it states that Reclamation must take steps necessary to require more accurate measurement and reporting of diversions and develop accurate techniques for determining both measured and unmeasured return flows to the river. EPA concurs with this statement of the Six States. We also firmly believe that an era of limits in the Lower Basin has begun and that accurate measurement of use and control of illegal diversions and uses is critical to the long-term sustainable use of the Colorado River water supply.

MITIGATION

31 1. The FEIS should describe whether MWD would provide reparation for increased shortages to specific Indian Tribes which are dependent upon CAP allocations. If reparation is not proposed, the FEIS should describe mitigation measures for potential adverse effects to Indian Tribes and their Indian trust assets.

32 2. Reparations to Nevada for potential increased shortages are also not described. The FEIS should provide the rationale for this decision.

TRIBAL ISSUES

33 1. Section 3.14 describes potential impacts to Indian trust assets. While Reclamation appears to have coordinated closely with the Ten Colorado River Tribes and Tribes utilizing Central Arizona Project (CAP) water, it is not clear whether the concerns of Tribes located in shared water basins/aquifers where the surplus water would be stored have been addressed. The

28: The purpose of this action is not to get California to 4.4 maf and thus the 4.4 Plan (now the CA Plan) is not within the scope of this EIS. Water transfers within California and their effects on and off the river are being handled by joint and separate NEPA and CEQA documentation. Through monitoring, verification, and accounting of all users uses, particularly as California begins to implement transfers and develop conservation programs, these data will be considered as part of the AOP process for measuring California's success in reducing its use to 4.4 maf. This description of monitoring, verification, and accounting of water use involves ongoing Reclamation processes that are outside the purpose and need of this action.

29: Reclamation is currently and has been monitoring diversions, return flows and consumptive uses by water users along the Colorado River since 1964. Reclamation is required by the Supreme Court (Article V, Supreme Court Decree in Arizona v California dated March 9, 1964) to prepare and maintain complete, detailed and accurate annual records of: releases of water through regulatory structures, diversions, returns and consumptive uses by State and diverter, water ordered but not diverted, and deliveries to Mexico in satisfaction of their entitlement. Reclamation began preparing this report in 1964. Since then, the accounting and monitoring procedures have been augmented with a monthly report tracking users diversion, returns and consumptive uses throughout the year. In addition to the monthly reporting and end of year accounting, Reclamation approves water use estimates by major water users before the beginning of each calendar year. Title 43, CFR 417 requires entitlement holders to provide an estimate of monthly diversion requirements (schedule), for Reclamationˆs planning purposes, prior to the beginning of the calendar year. The major water users are also required by contract to provide a monthly water use report which includes actual diversions and return flows. Others either report annually or have diversions and return flows reported by the USGS at the end of the year. This information is reported to all interested parties in the monthly reports and the annual report titled "Compilation of Records in Accordance with Article V of the Decree of the Supreme Court of the United States in Arizona V. California, Dated March 9, 1964." The schedules are reviewed by the water conservation, water contracts, and water operations staff to ensure that the next year demands do not exceed contract holders entitlements and that the water requested will be available in the system. Monthly reports are tracked throughout the year to monitor trends in water use which indicate what users are likely to exceed their entitlements. When surplus water is available, entitlement holders are allowed to divert up to their entitlement for surplus water, if any, in addition to their basic entitlement for a normal year in which no surplus would be available. How much surplus water was diverted by an entitlement holder can be determined only at the end of the calendar year by comparing the actual use, as reported in the Decree Accounting report, to their entitlement. Reclamation is developing a method to compare actual use to entitlements for the purpose of identifying surplus uses and uses in excess of entitlement.

30: Reclamation is taking steps to require more accurate measurement and reporting of diversions and return flows to the river. The most common case of water users who divert water without a contract involve persons who divert water from a well that is replaced with Colorado River water. Reclamation is, and for the last 5 years has been, funding the Geological Survey to perform an inventory of wells in the Colorado river flood plain and on adjacent terraces and slopes that have the potential to pump Colorado River water. The Geological Survey, at Reclamation's request and with Reclamation funding, has completed two reports which document a method for use in making a presumption if the use of water pumped by a well is pumping Colorado River water. The first report, published in 1994, provides a method of accounting for the lower Colorado River between the mouth of the Grand Canyon and Laguna Dam. The second report, published in 2000, provides a method of accounting for the lower Colorado River from Laguna Dam to Mexico. All uses of Colorado River water must be reported in the Colorado River water accounting report required by the Supreme Court (Article V, Supreme Court Decree in Arizona v California dated March 9, 1964). To date, the initial well inventory is about half complete and the methods documented in the reports identified above have been used to presume if new or planned wells would likely pump water that should be accounted for as Colorado River water. Few existing wells have been made subject to the methods described within the above identified reports. Reclamation recognizes that the accounting of water required by the Supreme Court must include accurate records of diversions, return flows, and consumptive use. Past efforts to uniquely and separately identify unmeasured return flows for individual diverters have met with mixed success. While estimates for many diverters currently exist, they cannot be considered definitive. Reclamation and others recognized many years ago that estimates on unmeasured return flows could not be made without first estimating consumptive use by some method other than measured diversion less measured return. To this end, the lower Colorado River Accounting System (LCRAS) was developed to estimate agricultural consumptive use as the evapotranspiration of the crops and related uses plus a portion of the residual of a water budget between major structures along the lower Colorado River. CONTINUED ON NEXT PAGE

cont'd FEIS should include more specific information on the government-to-government meetings held with all potentially affected tribes, a list of each Tribes' concerns, and how these concerns have been addressed. We are especially interested in how Indian trust assets would be protected in unadjudicated shared water basins/aquifers.

34 2. The majority of Section 3.14 is focused on potential impacts to Tribes that utilize CAP water. The evaluation is confusing because it refers to the loss of Non-Indian Agriculture water when discussing losses to Indian Central Arizona Project customers. We suggest providing a table with data of the potential loss of water to the Tribes (either collectively or for each Tribe) for each interim surplus criteria alternative for 2015 and 2050 with the assumption that the Gila River Indian Community Settlement has been implemented.

BIOLOGICAL EFFECTS

35 1. The DEIS appears to focus on potential impacts to special species within the region encompassed by Lake Mead, Lake Powell, and the Grand Canyon between Glen Canyon Dam and Lake Mead. It is not clear how extensively potential impacts to species below Lake Mead were addressed. We recommend the FEIS include, at least a summary, of potential impacts to biological resources in each of the significant reaches of the river (Lake Powell, Glen Canyon Dam to Lake Mead, Lake Mead, and below Lake Mead to the International Border).

36 2. Although the DEIS references the Biological and Conference Opinion on Lower Colorado River Operations and Maintenance (BCO), it does not provide a summary of the specific provisions made pursuant to the reasonable and prudent alternative as defined by the BCO. We recommend the FEIS provide this summary in order to provide a clear picture of what actions Reclamation is taking to benefit the riparian region of the lower Colorado River and its special status species.

37 3. We note that a separate Section 7 Endangered Species Act consultation is being conducted for this DEIS (pg. 1-25). We understand that consultation is not yet complete and that there is the intent to include consultation results in the FEIS. EPA supports this intent and urges Reclamation to make a firm effort and commitment towards completing consultation and providing a copy of US Fish and Wildlife Service decision within the FEIS.

GENERAL ISSUES

38 1. The DEIS states that the All-American Canal is used to divert water for Mexico (pg. 1-19). The FEIS should provide a short description of how this is done or provide this information on one of the project maps.

30 (cont'd): LCRAS is fully functional and is undergoing a demonstration phase. The LCRAS program has also funded a study by the Geological Survey to determine the standard error of estimate of the stream-flow gages along the mainstream used by the LCRAS water budget. The results of this study will not only improve LCRAS, but will also identify and quantify the practical limits of water measurement capabilities with the current measurement network in place; providing the basis for an analysis of technically feasible and economically justifiable modifications to the current water-measurement network. The effort to identify diverters who exceed their entitlements includes an analysis of water use by riparian vegetation within diverter boundaries to determine the proper portion of water use by riparian vegetation that should be included in the consumptive use calculation for each diverter. The implementation of LCRAS, together with a determination of what portion of water use by riparian vegetation should be charged to each diverter, will provide a complete and supportable value of consumptive use that can be compared with the contract entitlement of the diverter.

31: See response to Comment 56-6. Reparations as provided in the Working Draft of the Seven States Plan would assist all users of CAP water.

32: Reclamation is not proposing to make reparations part of the interim surplus criteria.

33: This issue is handled by an overall settlement in central Arizona between the United States and the CAWCD. The United States has made agreements which protect the Indian portion or interest in a shared aquifer. In addition, the storage of surplus water in an aquifer in a shared basin is considered a positive impact by tribes located within shared water basins because the water stored in the aquifer is increased. Chapter 5 has more specific information regarding the consultations with the Tribes.

34: Some non-Indian agricultural water has been reallocated to Indian users of CAP water. When non-Indian agricultural water is allocated to Indians, the water retains its non-Indian agricultural priority and is referred to as "non-Indian agricultural water". Table 3.14-4 shows the potential loss of water by tribes under the GRIC Settlement. Line 3 of the title of Table 3.14-4 has been corrected to read, "Likely Future With GRIC Settlement."

35: Additional analysis of potential effects below Lake Mead have been incorporated into Section 3.5, Water Quality, Section 3.7, Aquatic Resources, (potential effects of changes in Hoover Dam release water temperature on fisheries below Hoover Dam to Lake Mohave), and Section 3.8 to discuss potential effects between Hoover Dam and the SIB.

36: The noted documents are incorporated by reference and are available for review by the public at Reclamation's Office. The BCO has been provided to interested public and agencies and is available on Reclamation's web site.

37: Section 7 consultation is in progress.

38: Please refer to Section 3.3.4.5.4 for a description of river flows below Imperial Dam and delivery of water to Mexico.

39 2. Chapter 3 Affected Environment and Environmental Consequences often illustrates potential effects using figures and charts (e.g., Figure 3.3-19a-d, Figure 3.4-6). We suggest providing an explanatory example on how to accurately interpret these figures and charts.

40 3. Modeled annual depletions of various interim surplus criteria (e.g., Figure 3.4-12, pg. 3.4-22) indicate surplus conditions for the period 2001 to 2004. The FEIS should provide an explanation for this surplus. Is the high level of depletions available for these years because the system is already relatively full and can therefore provide surplus water for the next few years? or is this surplus due to the continued availability of unused Arizona apportionment?

39: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results.

40: The observed surpluses are due to relatively full starting conditions of Colorado River reservoirs. You will notice that the FEIS graphs have been modified. See Section 3.3.4.1 for a detailed explantion.

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impacts of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

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AESO/SE

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BLM '00

Memorandum

To: Regional Director, Lower Colorado Region, Bureau of Reclamation, Boulder City, Nevada (Attn: Jayne Harkins LC-4600)

From: Field Supervisor

Subject: Comments on Draft Environmental Impact Statement for Colorado River Interim Surplus Criteria, July 2000

The Fish and Wildlife Service has reviewed the draft Environmental Impact Statement (DEIS) for Colorado Interim Surplus Criteria and we have the following comments for your consideration in finalizing this document. General comments on the document are followed by specific comments relevant to each section of the document.

General Comments

The Service appreciates the efforts made to model the future water surface elevations, river flows and flood releases that have been made in this document. Discussions with Bureau of Reclamation personnel have assisted the Service in understanding the modeling assumptions and constraints and we thank the BOR for providing this opportunity. Future reservoir elevations, and thus the opportunity for declaration of surplus conditions over the interim 15 year period, are largely dependent upon inflows to the system, which in turn are dependent upon precipitation patterns that cannot be predicted. The models must therefore look back over the inflow records for the last 85 years to provide a potential view into the future. The effects to water supply and distribution that result from the application of the surplus alternatives to the model are thus entirely hypothetical and may never be realized under actual conditions. We suggest that this fact be stressed to assist the reader in understanding the implications of the action. Additionally, we have some other suggestions for improving the use of modeling. 1

The analysis results from using the models are not clearly articulated, and often the results are not connected or integrated to other sections where they are used. For example, Arizona depletions in Figure 3.4-5 show a very large median decline that is not reflected in Lake Mead elevations for the same time period. The relationship is unclear. Another example is in the river flow section, 3.3-32, where the relationship between the two analyses and the graphs and tables is not clear and is difficult to follow. Table 3.3-13 is especially confusing since water levels appear to be going 2 cont'd below

1: Comment noted.

2: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results. Mean monthly flows between Hoover and Parker Dams would increase during the interim surplus criteria period as a result of more frequent surplus deliveries (compared to baseline conditions).

2 cont'd — up when they should not logically do so. There are also several places in the various figures and tables where different colors or scales or patterns are used than in others of the same type and this is confusing. For clarity we recommend graphing figures that show percent of time levels are likely to occur as either "greater than or equal to" or "less than or equal to" and not use both in different places.

3 — There are also many subsections titled "baseline" that actually have all the graphs and tables that contain the surplus alternatives along with the baseline. This is helpful to provide side by side analysis. However, the text supporting the figures and tables does not always confine the observations to the baseline condition, and often there is no discussion anywhere later of the effects from the surplus alternatives. Please provide a discussion of all results in the appropriate places.

4 — In Section 3, there are many graphs in which the various percentile lines suddenly join, for example, when the 50th and 10th percentiles become the same level. It would be helpful to the reader if the reason why this occurs was more fully explained. It may not be intuitively obvious why the 50th percentile (50% above and below) should suddenly be equal to the 10th percentile (90% above and 10% below).

5 — At several places in the DEIS, the purpose and need for the adoption of interim surplus criteria are stated to be to increase the "predictability" and reduce the "uncertainty" of a surplus being declared by the Secretary. This is not exactly correct. The predictability of the 70R no action or Flood Control alternatives is based on the same water information as the more liberal alternatives. What is actually different is the probability that a surplus would be declared under the more liberal alternatives. The point of this process is to provide a way for California to be able to take more than its 4.4 maf apportionment while it implements the 4.4 Plan. This requires that the chance of a surplus being declared be increased from the baseline/no action.

6 — We question the separation of NEPA compliance for interim surplus criteria from that for the California Colorado River Water Use Plan (the 4.4 Plan) appears to be questionable. The DEIS and the 4.4 Plan clearly state that without the water provided by some form of interim surplus criteria, the 4.4 Plan cannot be implemented, thus the reason why the criteria are being proposed is clear. The California and Six States alternatives analyzed in the DEIS are very clear on that point as well. We are also concerned that the Flood Control alternative does not have the same inclusion of the water transfers from 4.4 Plan that are in the California, Six States and Shortage Protection alternatives. This suggests that the Flood Control alternative is not meeting the goal of the designation of interim criteria and its validity as an alternative is then questionable. Please explain why this alternative is treated differently.

7

8 cont'd below — We have other questions regarding alternatives. Given that this project is being done to provide California with a "soft landing" in bringing its actual water use in line with its allocation, we do not see any alternative that only provides exactly the amount of water each year over the 15 year period to keep Metropolitan Water District's aqueduct full. Additional water sources, such as

3: Comment noted. Additional explanation has been added to Section 3.3 and Section 3.4.

4: Specifically, changes in deliveries are often due to a "discrete" condition, such as the change from normal to shortage conditions. This can result in a sudden change in the 50th percentile line, as seen in Figure 3.4-5.

5: The purpose and need of the action is stated correctly. If surplus water is available all Lower Basin States may benefit as their water use needs approach and exceed their allocation. Nevada currently is using surplus water in calendar year 2000 and Arizona will benefit in the future when their need exceeds 2.8 maf. Reclamation's stated purpose to provide greater predictability allows Reclamation and users to project reservoir conditions and users several years ahead. This allows users advance knowledge of when surplus will and more importantly will NOT be available. The current AOP decision making does not give basin users predictability regarding surplus designations. The Secretary may use the increased probability of surplus, given certain hydrologic assumptions, in making his decision regarding the choice of interim surplus criteria.

6: See response to Comment 13-5

7: The water transfers are in the Flood Control Alternative operational modeling used for the FEIS.

8: The proposed interim surplus criteria are not intended to provide California only with the amount of water to keep the Colorado river Aqueduct full. As is currently the case, when the Secretary determines that surplus water is avilable in the lower Colorado River Basin, the surplus water is available to the three Lower Division states as discussed in the Decree in Arizona v. California. Under the proposed interim surplus criteria, all three states may avail themselves of surplus water. Although, all use schedules may not have included unused apportionment available from other states . Certainly, the Secretary, each year when he develops the AOP and approves water orders, would consider Article II(B)6 of the Decree.

8 cont'd unused allocation from Arizona and Nevada, should be factored into the amount actually needed by California. This concept is mentioned in the Six States Plan, but the analysis on that plan does not appear to include this point. If this idea was rejected early on, it should be mentioned as is the Pacific Institute's proposed alternative.

9 The descriptions of the alternatives in the Attachments contain ideas and concepts that do not appear to be reflected in the models or analyses done on the results. This includes requirements for California to meet at intervals during the 15 years, commitments to offset increased risks to Arizona that result from increasing supplies of water to California and other issues. It may be appropriate to include in the main part of the DEIS a discussion of these other issues to provide a fuller picture of each alternative.

10 We are concerned about the inclusion of the approximately 1.2 million acre foot increase in Upper Basin water depletions between 2000 and 2050 being considered part of the baseline for running the models. Environmental compliance under the National Environmental Policy Act and Endangered Species Act may not have been completed for all 1.2 million acre feet. Future water depletions should be considered under cumulative effects for NEPA, not as baseline unless compliance has been completed. Under the ESA, future Federal actions cannot be considered as cumulative because they must undergo their own section 7 consultation, so they do not factor into the analysis at all. It is important to provide for accurate analysis in both the NEPA and ESA forum. It may be useful to provide an explanation of why this increase in depletions is considered as it is in the document.

11 The DEIS could be more clear on which criteria, the 75R or Flood Control, has been used since 1998 to declare surplus conditions on the river. Our impression was that Flood Control criteria devised by the BOR and Corps of Engineers to provide for adequate space in Lake Mead was the governing factor. However, there is mention in the Attachments of the development of the 75R criteria to address surplus determinations. Please clarify which is correct for use as the no action alternative and which would be the default post 2015.

12 The effects analysis concentrates on the river section in the Grand Canyon and often does not include the river sections from Davis Dam to Lake Havasu or the Parker to Imperial reach. Since there will be effects to these reaches, they should be included in the effects sections.

13 There are many words and phrases in the text that could benefit from being placed in the Glossary such as the difference between water allocations, allotments and entitlements. Perhaps it would also be helpful to the reader if all words and phrases in the Glossary were highlighted somehow when they appear in the text.

Specific Comments

Note: Specific comments are grouped by the section of the document. Where there are comments common to several parts of the section, for example, models and results for Arizona,

9: The alternatives based on proposals by the states do not necessarily contain all the provisions of the state's proposals.

10: Reclamation did not structure the alternatives precisely as described in the attached proposals, but made some changes for consistency with Reclamation policy and operational procedures.

11: The 75R strategy was used for the baseline to represent the operation that has occurred in the recent past. In Reclamation's judgement the results of modeling the operation of Lake Mead with the 75R strategy provided a suitable representation of the past conditions. The choice between 75R and 70R was a "close call"; however, and as the result of public comment of the DEIS, Reclamation used the 70R strategy for operational modeling of the alternatives in this FEIS. While it is correct that the flood control operating rules have played a major role in operating the system and determining surplus water in the last few years, the flood control rules have not always been used so the average operation is not strictly consistent with the flood control rules. Moreover, in the future when flood control operation does not occur, surplus determinations will be made using the AOP process which considers a dynamic range of factors that may not involve flood control operations.

12: Additional discussion of potential effects below Lake Mead have been incorporated into Section 3.5, Water Quality; Section 3.8, Special-Status Species; and Section 3.7, Aquatics (potential effects of changes in Hoover Dam release water temperature on fisheries below Hoover Dam to Lake Mohave).

13: The FEIS includes definitions in the glossary for water allocations, water allotments, and water entitlements. Words cited in the glossary will not be highlighted in the text of the document due to concern that it would be confusing and detract from the flow and readability of the document.

Nevada and California, they are provided once with the understanding they apply to all times the issue is presented.

Summary

Most of the comments in this section reflect ones that will be made in the appropriate DEIS section, but are provided here for completeness.

14 Page S-2, S.1.4
The purpose and need for the action should more clearly focus on the need for California to have additional water in order to implement the 4.4 Plan, and that "predictability" is not a driving force for the interim criteria.

15 Page S-3, S.1.5
Please explain why the California Colorado River Water Use Plan is not considered to be a part of this action since the interim surplus criteria are essential to its success.

16 Also, under "Actions Related...", reasonable and prudent alternatives are not conservation actions. The latter are voluntary and the former are mandatory.

17 Page S-4, S.2.1
Please clarify whether the 75R or the Flood Control alternative should be correctly considered the baseline condition.

18 Page S-5, S.2.2.
Please clarify how this is different from the way past surpluses were declared. Also, please explain whether or not this alternative provides all the water anyone wants to request, or if it is limited to the amount of water over the 1210 elevation that can be given out to contract holders.

19 Page S-6, S.2.4
Please explain what would be meant by adjustments to the tiers based on demand projections and other factors. Does this mean the tiers could be made more liberal or only more conservative? If more liberal, would additional compliance be needed?

20 Page S-6, S.2.6.
Which option, the 75R or the Flood Control, would become the default criteria in 2016?

21 cont'd below Page S-7, S.3.3.
Under Reservoir levels, it should also be noted that the lowest reservoir levels do not occur in January, which is when the value for the models is taken. Thus, reservoir levels in July, which for Lake Mead is the lowest month, will be lower than the analysis assumes. This difference has effects to the analysis. Also, although monthly fluctuations may be within the

14: The form and content of the summary has changed to reflect the FEIS. All Lower Basin States will benefit from the purpose and need for the action with the predictability of surplus triggers and deliveries that are dependable over the 15 year period. The surplus water that California will receive is replacement water for declining unused apportionment of the other Lower Basin States. Without the proposed action, under the No Action Alternative surplus determinations would be made by the Secretary through the AOP process. Under the Law of the River, California would still be entitled to 50% of any surplus determination and any basic or surplus apportionment unused by the other Lower Basin States. The purpose and need for this action will firm up water supplies for the next 15 years for water management purposes for all Lower Basin States.

15: The California Colorado River Water Use Plan is not part of the federal action because the Plan contains purely California state actions. Reclamation's only federal action is to develop and implement interim surplus criteria which has independant utility in Colorado River management. The Secretary can and has delivered surplus without these criteria as noted under the No Action Alternative. California could be sucessful in reducing its excessive use of Colorado River Water through the Seven Party agreement if the parties could resolve their differences. The Plan will augment the Seven Party agreement for future water needs and uses.

16: Comment noted

17: The 70R strategy has been used for the baseline in this FEIS.

18: Under this alternative, surplus water would be determined to be available using the same procedure that has been used in the past when flood control releases have been made. Surplus water determinations would be limited to years when flood control releases are needed. Once a surplus determination has been made, the Lower Division States would be allowed to divert as much surplus water as they can put to beneficial use. The estimated amounts of surplus water they would divert in specific future years are contained in the States surplus water demand schedules, as discussed in Section 3.4.

19: The elevations of the tiers in the California Alternative were selected so as to control the depletion of storage in Lake Mead and Lake Powell year by year in the light of the growing Upper Basin depletion schedules. The provision for adjustment is to compensate for shifts in Upper Basin water use and thus keep total Basin depletions in future years as presently projected under this alternative. The direction (up or down) in which the Upper Basin depletion schedule may change is conjectural. No additional NEPA compliance would be made in the event of such change.

20: After the 15-year interim period, the operation of Lake Mead would revert back to the AOL process, which is represented in the operation model by the 70R strategy for the FEIS.

21: The distinction between the summer low and the end-of-year level is noted in Section 3.3.4.2.3 of the FEIS. The summary has been rewritten.

21 cont'd range of 15-20 feet, over the course of the year it may be as much as 75 feet. The point about reservoir levels not having gradual changes, but changing in very discrete ways each year, is well made.

Page S-8, S.3.4.

22a How often would the 75R or Flood Control alternatives provide for a surplus declaration?

22b There is also the question of when the entire allocation of a State is being used. Some Indian Tribes on the river are not using all of their water and the implication given here is that full allocations are being used by 2004.

23 The issue of flood flows to Mexico is also raised. Mexico can only get its 200,000 acre feet of "excess" flood water under the Flood Control alternative, and then only after all beneficial uses under surplus water contracts in the U.S. are filled. The conditions under the more liberal alternatives that would provide Mexico with this water should be mentioned in this summary.

Page S-10, S.3.6.

24 Flood releases should not just be reviewed in terms of damaging flows, but in terms of lower releases that may provide biological benefits to groundwater, backwater and marsh freshening and sediment transport. The Service recognizes that predicting these lower flows is more difficult, but the effects of losing these due to the liberal criteria may be important.

Page S-10, S.3.7.

25 It is surprising to us that no effects to the fisheries in Lake Mead are predicted to occur. Data on effects of severe fluctuations, long-term reduced water levels and other factors is available in the literature on reservoir management (for example, see Blodgett 1983 and Hall 1971).

Page S-11, S.3.8.

26 Special status plant species may also lose existing habitat if receding lake levels dries it out of usable condition. Also, new habitats may be colonized by other species and not provide habitat for the species of interest.

27 Fluctuating water levels also have adverse effects to nesting of both Yuma clapper rails and black rails. While marsh habitat may be formed, water level fluctuations may render it less suitable.

Page S-12, S.3.8.

28 There may be effects to razorback sucker reproduction and recruitment in Lake Mead that are not adequately addressed in the DEIS.

Page S-13, S.3.10.

29 It should be noted that power contract renewals will have an effect on the amount of power generation lost and the amount of mitigation needed. Power generation is dependent upon the available water and is subservient to it.

22a: The probabilities of surplus water for the Lower Division states are shown on Tables 3.4-1, 3.4-2, and 3.4-3.

22b: Tribal water allocations are included in the state apportionments. If a Tribe is not using part of its water allocation, the unused part is available for other users within the state.

23: A surplus for Mexico is only made under flood control conditions.

24: Comment noted. Flow variations up to the level of damaging flows are inherent in the analysis of habitat along the river, as analyzed in this FEIS.

25: The analysis recognized that fluctuations anticipated for the action alternatives are within historical ranges under which native species have diminished in the reservoirs. Populations of non-native sportfish species have, in general, become well established in the reservoirs, and the interim surplus criteria alternatives are not expected to result in any change to this trend.

26: The summary has been changed to include the observation that new habitats could be colonized by other species, in particular non-native weedy species. This is also discussed in Section 3.8 in the Environmental Consequences subsection.

27: The following statement has been added to the FEIS "In addition, fluctuations in water levels may potentially disrupt nesting of Yuma clapper rail and California black rail".

28: Revisions were made to Sections 3.8.2.3.3 and 3.8.2.3.3.5

29: This analysis does not make any assumptions related to contract renewals. However, it is possible that Western Area Power Administration would only make contract commitments when the current contracts terminate based on the foreseeable amounts of capacity and energy during the next contract term.

30 Page S-15, S.4.3.
It might be helpful for readers to mention here that the models are not predictive, and thus the actual costs and benefits realized are not known. An explanation of the increased opportunities for more efficient use of river water supplies is also appropriate, since no real conservation program that would free up river water for other beneficial uses is proposed in the plans.

31 Page S-16, S.4.4.
A statement on the need for California to show sufficient progress in meeting the 4.4 Plan as essential to the continuation of use of interim surplus criteria should be included here.

Chapter 1: Introduction and Background

32 Page 1-1, 1.1
Please cite the source of the management objectives provided in the 2nd paragraph.

33 Page 1-3, 1.1.2
Paragraph 2: Please include information on how many surplus years have been declared to date.

34 Page 1-3, 1.1.3
paragraph 1: Please note that the LROC is provided in Attachment A. Also, please include here that the reason why the current surplus criteria are inadequate is because of California's need for extra water while the 4.4 Plan is implemented.

35 paragraph 2: Please explain whether Arizona or Nevada can get flood surplus water (or indeed, any surplus water), if they are not already using their entire normal allocation.

36 Page 1-4, 1.1.4
please explain more fully how and when Mexico can obtain the 200,000 af of water under the existing conditions. Do all potential U.S. uses have to be met first?

37 Page 1-8, 1.3.1
paragraph 1: Although it is noted in item 7 on page 1-9, please explain here why the Gila River inflow is not counted as Colorado River water. This section is somewhat confusing to the reader on the issue of what water counts and what does not.

38 Page 1-12, 1.3.2.2.1
paragraph 1: In the depletion schedules, the Upper Basin depletions reach approximately 5.2 million af. This paragraph indicates a use of 6 maf. Please address this discrepancy.

30: Reclamation believes that the current discussion in this section is adequate.

31: As discussed in Section S.4.4, continuation of interim surplus criteria would be at the discretion of the Secretary. The Secretary's decision to continue or terminate interim surplus criteria would be based on a number of factors which may include California's progress in meeting the goals of the California Colorado River Water Use Plan.

32: See Table 1-1, "Documents Included in the Law of the River" for the complete reference. The specific documents to note as sources are: The Boulder Canyon Project Act of 1928, the 1964 Supreme Court Decree in Arizona v. California, and the Colorado River Basin Project Act of 1968, the Long Range Operating Criteria of 1970, and 43 CFR 417, "Procedural Methods for Implementing Colorado River Water Conservation Measures with Lower Basin Contractors and Others."

33: Section 1.3.4.1 provides data on how many surplus years have been determined.

34: See response to Comment 57-5. Currently, there is no specific surplus criteria. The surplus determination is made annually using the Annual Operating Plan process and dynamic factors. This does not allow the Lower Division States the ability to plan their internal water management as well as they might.

35: Under the terms of the Decree, when a Lower Division State needs more than its apportionment of consumptive use, the Secretary may make unused apportionment from another state available to it. If the total Lower Division consumptive uses do not exceed 7.5 maf, surplus water is not needed by the Lower Division States. Surplus water may be made available to entities in Arizona, California and Nevada who have entered into surplus water contracts with the Secretary. Surplus water, when made available, is shared as specified in the Decree--50 percent for use in California, 46 percent for use in Arizona and 4 percent for use in Nevada. Unused surplus water by one state may also be made available for use in another state.

36: Section 3.3.3.3, General Modeling Assumptions describes the assumptions made in regards to when deliveries of Treaty surplus are available to Mexico.

37: We have revised paragraph 1.3.1 in the FEIS to make this clarification.

38: The discrepancy is due to the fact that the depletion schedule in Attachment J of the DEIS does not account for evaporation from Upper Basin storage units. This evaporation is shared by the Upper Basin States and should be accounted for as an Upper Basin depletion. After allowing for evaporation, the projected Upper Basin depletions will be very close to 6.0 maf in year 2050. We have updated Attachment K in the FEIS to show a column for evaporation from Upper Basin storage units.

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39 Page 1-12, 1.3.2.2.2
paragraph 2: Is it appropriate here to note how much of the state allocations are not being used (this would include Tribal Rights) that is currently being used by California, and how that amount of water should be first considered before any surplus is provided?

40 Page 1-14, 1.3.2.2.2
paragraph 1: Could a reference be made here to where the listing of PPRs and amounts is given in the DEIS?

41 Page 1-14, 1.3.2.2.3
paragraph 1: In the event of Gila River flows, are normal deliveries to Mexico suspended, under the concept that they can take their apportionment out of the excess water in the river?

42 Page 1-15, 1.3.3
paragraph 2: Please describe the type of NEPA and ESA compliance done for the LROC reviews and modifications.

43 Page 1-15, 1.3.4.1
paragraph 2: The Secretary retains the discretion to give unused allocation to another State. Is there any situation where he would not give the water to a potential beneficial use? For example, if reservoir levels were depressed by several years of drought? The contracts for such use are always temporary, are they not?

44 paragraph 3: Can a State that is not using its whole allocation get any surplus water under the present criteria or any of the potential interim surplus criteria?

45 Page 1-16, 1.3.5
paragraph 1: This paragraph is confusing. We suggest the storage amounts for Mead and Powell be specifically mentioned here instead of in the 2nd paragraph. If Lake Powell also contains upper and lower basin storage, that should be broken out.

46 Page 1-18, Table 1-2
Please note where the AAC contribution mentioned in the preceding paragraph is included in this Table. How does the AAC contribute to Mexico deliveries?

47 cont'd below Page 1-19, 1.3.6
paragraph 3: The issue of how much space in Lake Mead is dedicated to flood storage is not completely clear. The 1.5 maf of space for rainfall floods is clear, however, the amount of space needed for snowmelt is not provided. The total storage space needed is defined on page 1-20, but it is still unclear how much is needed in Mead. If this space requirement is flexible based on the amount of storage in other reservoirs, the amount of snowpack predicted, or other factors, these should be provided in the explanation. Perhaps a table of storage space provided in Mead over time would be helpful. Since the availability of flood storage space is an important factor in

39: Consumptive use of Colorado River water in Arizona reported in the Article V Decree accounting records was 2,853.9 kaf in calendar year 1997. Annual consumptive use in Arizona has been less than 2.8 maf in calendar years 1998 (2,566.7 kaf) and 1999 (2,728.0 kaf), and has been projected to be about 2.7 maf for 2000. Consumptive use of Colorado River water in Nevada is projected to exceed that state's 300 kaf apportionment during calendar year 2000. To the extent that all water apportioned to any Lower Division state is not used in that state during any year, the Secretary may release that unused apportionment water under Article II (B) (6) of the Decree for consumptive use in another Lower Division state. Any unused apportionment so released for use in another state will be accounted for as such, effectively reducing a state's use of surplus water.

40: The listing of PPRs and amounts is not in this FEIS but may be found in the supplemental Decree in Arizona v. California, entered by the United States Supreme Court on January 9, 1979 (439 U.S. 419).

41: In the event that the Gila River flows, normal deliveries to Mexico are not suspended. Any Gila River water that flows into the Colorado River becomes Colorado River System water that can be delivered to Mexico in satisfaction of the Mexican Water Treaty. If any Gila River flows result in more water being delivered to Mexico than Mexico scheduled, such excess deliveries do not count against the quantity of water delivered under the Treaty.

42: No NEPA or ESA compliance is required for ongoing operations, such as the LROC reviews under the criteria. However, a categorical exclusion checklist, dated October 31, 1997, was completed for the most recent LROC review that was initiated on August 14, 1996. In the event a review of the LROC identifies a need for a revision of the LROC, appropriate environmental compliance will be completed.

43: Article II(B)(6) of the Decree does not preclude the Secretary from releasing a Lower Division State's unused apportionment for consumptive use in the other Lower Division States. This article of the Decree further stipulates that the users of another state's unused apportionment do not accrue rights to repeated use of this water. This means the Secretary has discretion as to whether to release this water. The Secretary will consider many factors, including but not limited to current and projected reservoir storage, hydrologic conditions, and requests for water deliveries for beneficial use in determining whether to release a state's unused apportionment for use in another state. Section 5 of the Boulder Canyon Project Act requires contracts for delivery of Colorado River water to be for permanent service. Although a Colorado River water delivery contract is for permanent service, unused apportionment is available only when a state does not use all its apportionment and the Secretary releases that water for consumption in another state.

44: During a surplus year, an individual entitlement holder's schedule, diversion, and use of Colorado River water may include both a basic entitlement and surplus water. At the end of the year, the total consumptive use in the entitlement holder's state that year may be less than the apportionment that otherwise would have been available for use in that state in a normal year (basic apportionment). Therefore, even though Colorado River water may be scheduled, diverted, and used as surplus by individual entitlement holders, when Reclamation compiles the annual Article V Decree accounting records after the end of the year, Reclamation would account for this water as basic apportionment. Reclamation accounts for all water use in a Lower Division State as basic apportionment until the consumptive use in that state equals the basic apportionment for that state. This method of accounting is possible because any Colorado River water not used by an entitlement holder in any year passes to another entitlement holder in that state through existing contracts under the water-use priority system for that state.

45: We have modified the section for clarification. Section 1.3.5 describes the facilities on the Colorado River system and their respective storages, not the allocation of water to the Upper and Lower Divisions.

46: A portion of the water delivered to Mexico at the NIB is diverted in to the All American Canal and is delivered through the Pilot Knob and Siphon Drop powerplants into the Colorado River above the NIB.

47 cont'd | the analysis, this additional information would be useful to the reader. Also, if there is flexibility on where the water is stored, this could provide a method to prevent Mead elevations from declining as much if flood storage was available upstream and Mead allowed to stay at a higher elevation.

47: The paragraph has been modified for clarification. For more detail regarding flood control releases, we would refer you to the COE Water Control Manual for Hoover Dam, Lake Mead.

48 | Page 1-20, 1.3.6
paragraph 3: Please describe the relationship between rainfall and snowmelt storage space in Lake Mead.

48: Clarification has been made in Section 1.3.6.

49 | paragraph 4: Since other parts of the DEIS evaluate the effects of having 40,000 cubic feet per second flows, and we know that there are portions of the channel that cannot safely pass those flows, please discuss how the floodway program will be implemented to provide for such capacity.

49: Details of the responsibility of the various federal agencies is outlined in the "Final Report of the Secretary of the Interior to the Congress of the United States on the Colorado River Floodway Protection Act", dated October 1992. Some of the major implementation methods have been the incorporation of the floodway maps into the National Flood Insurance Program and the Department ensuring that leases and uses of federal lands adjacent to the river are consistent with the operation and maintenance of the floodway.

50 | Page 1-21, 1.4
1.4.1: There is no extant NEPA or ESA on this action. We still have concerns about the lack of integration in this DEIS of portions of the 4.4 Plan that require the surplus criteria to be in place. That the section 7 consultation on the interim surplus criteria will also include portions of the 4.4 Plan indicates the degree of linkage between these actions.

50: See response to Comment 13-5.

51 | Page 1-23, 1.4
1.4.3: As noted in the summary, reasonable and prudent alternatives are mandatory, and do not qualify as voluntary conservation actions.

51: Comment noted.

52 | Page 1-26, 1.4
1.4.4: The 2nd sentence of the 2nd paragraph addressing surplus criteria in the 1997 BCO is out of place in this paragraph. In the 4th paragraph, it should be noted that non-Federal partners in the LCRMSCP will obtain ESA coverage along with the Federal partners.

52: The text has been revised as noted.

Chapter 2: Description of Alternatives

53 | Page 2-1, 2-2-1-1
paragraph 2: Are the total runoff figures for the 70R and 75R based on runoff in the entire Colorado River basin? If so, perhaps it would be helpful to include the average runoff amount for reference purposes. Additional information on why the 75R and not the Flood Control alternative was selected to represent the baseline is needed here. It is important to be clear on what method was used to determine if surpluses in the past did or did not exist.

53: The "R" strategies are based on the runoff in the Upper Basin, measured at Lees Ferry, which is described in Section 3.3. Please See the response to Comment 57-11 regarding the selection of the 70R strategy.

54 | Page 2-2, 2.2.1.2
The "R" strategy is based on the yearly availability of storage space. Is the "P" strategy based on a yearly Lake Mead storage, or is it computed using more than one year to project the risk of shortage?

54: The "P" strategy is computed using more than one year to project the risk of shortage. See Section 2.2.13 for additional information.

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55 Page 2-2, 2.2.1.4
If the Flood Control Strategy is what was used to determine surpluses in 1998-2000, then why was the 75R chosen as the baseline and no-action alternative? Also, how does the Flood Control Alternative differ, if at all, from the criteria used in 1998-2000?

56 Page 2-3, 2.2.2
paragraph 1: What is a "conjunctive use program?" This section should also look at why a program that only provided enough extra water to meet California's needs after all other available sources had been tapped is not considered in this DEIS. The California alternative does not have this direction.

57 Page 2-3, 2.2.3
paragraph 2: Although the increase in water deliveries to Mexico is not in the purpose and need of the interim surplus criteria, other features of the Pacific Institute proposal do meet the purpose and need and should be reviewed for how they would meet the needs of California.

58 Page 2-4, 2.2.4
paragraph 3: If the DEIS does not contain the full complement of items in the California and Six States alternatives, how can a decision be made on implementing the entire plan from the analysis in the DEIS? What actually is being covered, and how does the lack of coverage for other parts of the alternatives affect the analysis? Please explain more fully.

59 Page 2-4, 2.2.5
paragraph 1: The designation of a surplus condition under the no action and baseline condition is not less predictable or more uncertain than under the more liberal alternatives. The probability of a surplus being declared is less, because the criteria under these two alternatives are more conservative in retaining water in Lake Mead. The same information used to determine water levels in the reservoir over time apply for all alternatives. The more liberal alternatives provide for a higher probability that the analysis will enable a surplus to be declared over the no action and baseline condition.

60 Page 2-5, 2.2.5
paragraph 2: Please clarify why the 75R was selected as the baseline condition and not the Flood Control criteria actually used in 1998-2000 or the 70R used in planning. Use of the more liberal 75R to represent the baseline when it was not used as such is inappropriate. The discussion here of the choices made needs clarification.

61 Page 2-5, 2.3
paragraph 1: Do we include in the alternatives a written policy on exactly what California has to accomplish each year or set of years in order to justify the continuation of interim surplus criteria?

62 cont'd below
paragraph 2: Flood Control is an alternative for discussion even though it may actually be the no action alternative, and 75R, which is not the actual baseline, is not an alternative. This

55: See the response to Comment 57-11 regarding the selection of the 70R strategy as the baseline. The determination of surplus conditions under the Flood Control Alternative would be the same procedure as was used in 1998-2000.

56: A conjunctive use is a state authorized program based on the use of a rechargeable groundwater aquifer to supplement surface water supply during periods of shortage. Groundwater pumped at such times would be replaced by artificial recharge when recharge water is available. See the response to Comment 57-8 regarding the formulation of an alternative to meet only California's needs.

57: See the response to Comment 11-6 and 11-8.

58: The Six States and California Alternatives are derived from the triggers and other operational provisions described in the respective proposals from the states, but the alternatives evaluated do not necessarily contain all the provisions of those proposals. Thus what is actually covered and proposed for implementation is the specific provisions of the alternatives described in Chapter 2 and in the detailed Guidelines in Attachment I. The operational modeling results, expressed in terms of river flows, reservoir levels, and the associated environmental impacts for each alternative are unique to the specific provisions of each alternative.

59: While it is true that the alternatives having lower trigger elevations than the baseline increase the probability of surplus water determinations during the interim period, the predictability aspect is critical to the integrated management of available water resources by the Lower Division States. Each of the Lower Division States currently manages surface and groundwater sources to meet its water delivery commitments. The establishment of triggering elevations on Lake Mead or flood control rules as the criteria for determining surplus water availability would enable water planners of the Basin States to forecast Colorado River water availability in advance with a reasonable degree of certainty and thereby avoid unpredictable water supply shortfalls that could result from year-to-year determinations under the AOP process.

60: Section 2.2.5 has been revised.

61: Please see response to Comment 33-3.

62: Section 2.3 has been revised for clarification.

62 cont'd | issue should be clarified. Also, exactly what method of surplus determination that will be used in 2016 and beyond should be clearly stated here.

63 | Page 2-6, 2.3.1.1
In the last sentence of this paragraph, please add the word "only" between "would" and "be." Since the 75R is a conservative plan, surpluses would only be achieved when lake levels are very high.

64 | Page 2-6, 2.3.1.2
The data set of past inflows used to run the 75R models should be the same as for the other models. The first sentence of this paragraph implies otherwise. Although there is no trigger elevation because the yearly storage need is variable (due to projected inflows), is there some elevation below which water would not be removed? Are the 1194 and 1196 feet elevations minimums that would not be compromised? Is there likely to always be enough water in the system when this criteria is met to meet all the States desired depletions? How does Mexico qualify for its 200,000 af under this alternative?

65 | Page 2-7, 2.3.2.1
The baseline/no action alternative can declare a surplus in any month through to the end of the water year. Does the Flood Control alternative operate like this, or is it like the other alternatives that determine a surplus in January? Should there be a 5 year review associated with this alternative?

66 | Page 2-8, 2.3.2.2
paragraph 1: Where was the 1211 elevation figure derived from? This is less than the 1.5 maf flood pool defined earlier. Is this the average elevation needed for snowmelt flood control? Should there be a 5 year review associated with this alternative?

67 | Page 2-9, 2.3.3.2
paragraph 1: The tier lines on the Six States alternative do not increase over time to account for increased future depletions from the system. How does this change the effects from those that would be seen in the 75R or California alternatives where there is an increase? We also suggest that the section provide brief information on the allowed uses of water in each tier without having to reference Attachment G. The amount of water generated should also be mentioned.

68 | Page 2-10, 2.3.3.2.1
paragraph 2: Why did the modeling not use the 70R trigger called for in the alternative? If this alternative was selected, would this change be made to the alternative description? How does this change the results of the analysis that might favor or dis-favor the alternative?

69 | Page 2-11, 2.3.3.2.4
How would Mexico receive surplus water under this alternative?

63: The change has been made.

64: The same runoff data is used for the Baseline and all the alternatives. This point was clarified in the section cited. The elevations of the triggering line during the interim period are based on a statistical analysis of required reservoir space for runoff in relation to the cited percentage of runoff (i.e., 70R). If a surplus is determined based on that line, it is possible for the level of Lake Mead to go below the triggering line, depending on actual runoff conditions in the year. In as much as the baseline triggering elevations for surplus water determination would involve a relatively full condition of Lake Mead, there would be sufficient water to meet the States' desired depletions. Mexico would receive its additional apportionment of 200,000 acre-feet in years when flood control releases were necessary. This would occur when Lake Mead levels were high enough to invoke the flood control operating rules (i.e., the Lake Mead levels indicated by the average Flood control release trigger shown on Figure 2-1).

65: A surplus may be determined in any month for any alternative due to flood control 70R and the other surplus alternatives determine surplus at the first of the year. See Section 11.1.1 for information regarding the 5-year review of the interim surplus criteria.

66: A five-year review is included in this alternative.

67: See Section 2.3.2.2 for information regarding the 1211 elevation. See Figure 3.3-10 for information regarding the 1.5 maf flood pool.

68: See response to Comment 37-8.

69: Under the Six States Alternative, as under all alternatives, Mexico would receive its additional apportionment of 200,000 acre-feet in years when flood control releases were necessary from Lake Mead.

70 Page 2-11. 2.3.4.1
If the trigger elevations are allowed to be revisited every 5 years, could they be made more liberal (to allow for additional surplus opportunity) or only more conservative? If more liberal, how will environmental compliance be accomplished for any additional impacts?

71 Page 2-12, Figure 2-4
Which tier 3 would be implemented if this alternative is selected? The one in the DEIS or the original California one?

72 Page 2-13, 2.3.4.2.4
How would Mexico receive surplus water under this alternative?

73 Page 2-16, Table 2-1
In the 2nd paragraph under Lake Powell effects, should the 3838 figure be 3638?

74 Throughout the table, the words "similar to" describe effects among alternatives. In a summary table this is acceptable, but the full text discussions should be more specific.

Chapter 3: Affected Environment and Environmental Consequences

3.1: Introduction

75 Page 3.1-2, 3.1.3
As stated previously, the no action or baseline condition lacks probability, not predictability. The criteria that were used in 1998-2000 to determine surplus should remain the no action alternative and be the criteria post 2015.

3.2: Potentially Affected Area

76 Page 3.2-1, 3.2
The effects of providing for interim surplus water extend beyond the Colorado River corridor. This water will be used to facilitate land development and provide a hedge against future shortages that could influence how that development occurs. Most of these developments are not speculative. Even if there are no new developments that could be considered, the presence of this water will enable the continuation of existing development plans. This is an effect that needs additional discussion. The presence of completed Habitat Conservation Plans for some of the development areas should be mentioned, as should be the lack of such plans in other areas.

77 Page 3.2-4, 3.2.1.4
This reach of the river is not included in many of the subsequent analyses and it should be so included. Please make sure the effects are discussed in the document.

70: The trigger elevations could move up or down. Appropriate environmental compliance would be performed.

71: If the California Alternative were selected, the tiers described in Chapter 2 of the FEIS would be implemented.

72: See response to Comment 57-69.

73: Yes. A correction has been made.

74: Comment noted.

75: The Secretary currently considers a number of factors consistent with the Long Range Operating Criteria to determine, on an annual basis, whether or not surplus conditions exist in the Lower Basin. This process (the No Action Alternative for the purpose of the Interim Surplus Criteria EIS) provides less certainty with regard to surplus determinations than the action alternatives under consideration. See FEIS Section 2.2.5 for information regarding the baseline used for analysis in the FEIS, as well as response to comment 11-9 and 57-5 for additional information.

76: Effects from the use of Colorado River water outside of the river corridor is beyond the scope of analysis necessary to determine the potential effects of interim surplus criteria. Also, see response to Comment 56-4.

77: See response to Comment 67-12.

3.3: River System Operations

78 General Comments: The reservoir operations section is much clearer and more informative than the river reach sections. The latter should be reviewed and rewritten to provide for greater clarity and understanding for the reader.

78: Additional explantion has been added to Section 3.3.4.5.

Page 3.3-4, 3.3.1.2

79 The discussion of storage space needed in Lake Mead for rainfall and snowmelt is not clear from this discussion. The percentage or actual space that has been made available in Mead over at least the time period covered by the current flood control operations criteria should be provided. A specific figure is given for Lake Powell in the preceding section. Since the normal space building releases are less than those needed for water users, how does Lake Mead empty the required space in accordance with the schedule? Since Lake Mead water levels are highest in December and January and lowest in July, how does this relate to the storage required in Table 3.3.2?

79: The US Army Corps of Engineers is responsible for developing the flood control operation plan for Hoover Dam and Lake Mead pursuant to 33 CFR 208.11. Please refer to these regulations for a more detailed description of the Corps flood control and space building operations. Specifically, space building releases can be as high as 29,000 cfs while releases to meet downstream demands are typically less than 20,000 cfs. Lake Mead is typically lower in the summer as increasing downstream demands are met. This should not be confused with the space requirement, which in effect sets an upper limit on the storage at Lake Mead.

Page 3.3-8, 3.3.3.2

80 paragraph 2: This is confusing as far as Mexico's flood surplus is concerned. Does the DEIS intend to say that regardless of the alternative under analysis, there has to be enough water in Lake Mead to trigger what would be the COE flood control requirements before Mexico would be able to get its 200,000 af? If that is the case, please explain how this could happen (would these years be part of the 90th percentile line, or somewhere else)?

80: Yes. This is the modeling assumption used for all alternatives and baseline. Flood control releases occur when the hydrologic inflow, combined with the storage in Lake Mead, results in releases (in excess of downstream demand) necessary to meet the flood control regulations. Flood control releases occur in approximately 35% of the traces in 2007 and in 22% in 2016, under baseline conditions (see Figure 3.16-1).

Page 3.3-9, 3.3.3.3

81 Assumptions Common: The first two assumptions reinforce the need to look at how Lake Mead storage is determined under the requirements in Table 3.3.2. If available storage in the Upper Basin affects storage available in Lake Mead, and increased depletions from those reservoirs increase the available storage, what storage is needed in Mead? Further, if changes could be made to these storage criteria (does BOR have discretion?), could these be used to reduce or eliminate adverse effects to reservoir levels and flood flows resulting from the proposed action? Should this be an alternative?

81: Reclamation does not have the authority to modify the system space requirements (Table 3.3.2). As described in Section 3.3.3.3 and Attachment J, a minimum space of 1.5 maf is required at Lake Mead for flood control.

82 The assumption of future Upper Basin depletions is questioned by the Service. At most, only some of these belong in the baseline and the rest are part of cumulative effects. No separate analysis for cumulative effects was run, and this should be clarified.

82: See response to Comment No. 57-10.

83 Assumptions Specific: Why does the Flood Control alternative not include the implementation of the 4.4 Plan? If the actual purpose and need of developing the interim surplus criteria is to provide water to implement the 4.4 Plan, then the Flood Control alternative does not meet the need. Please explain why this decision was made.

83: In the FEIS, the Flood Control Alternative includes implementation of the California Colorado River Water Use Plan. See response to Comment No. 37-11 for additional discussion.

84 cont'd below Page 3.3-11, 3.3.3.5

paragraph 2: This is an extremely important paragraph and the concepts herein should be stressed earlier in the DEIS. The models are not predictive, nor are they probabilistic for actual

84: The referenced statement and paragraph is appropriately located under Section 3.3 - Modeling and Future Hydrology.

84 cont'd future flows. It should be noted that they do not represent best or worst case futures, only that they are the past brought forward for use.

Page 3.3-12, 3.3.3.6

85 paragraph 3: It should be noted here that the end of year elevations do not represent the lowest point for water levels over the year. As stated in various places in the DEIS, reservoir elevations vary monthly by 15-20 feet or more up to 75 feet over the course of a year. Especially for the 10th percentile figures, lake levels may go below critical levels over the course of normal operations. Lake elevations in Mead reach their lowest point in July, and are declining over the six months previous.

Page 3.3-13, 3.3.4

86 Transit time through the reservoirs, especially at low reservoir elevations, is likely to increase. How this affects productivity is an issue that should be mentioned when this analysis is discussed.

Page 3.3-14, 3.3.4.1

87 paragraph 2: More information on the "equalization" rules is needed somewhere in this document.

88 paragraph 3: Why was the Shortage Protection alternative analyzed differently? Will the revised analysis in the FEIS be more liberal or more conservative in showing a surplus? If it is more conservative, as one assumes it would be since the existing did not protect at 80%, does this reduce the effects of this alternative? Since this is often the alternative with the highest effect, this is an important consideration.

89 Page 3.3-15, 3.3.4.2.2

paragraph 1: When are Lake Powell water levels lowest?

Page 3.3-17, 3.3.4.2.3

90 paragraph 1: This paragraph is very important to understanding the modeling. We suggest that the concepts of the traces as shown in Figure 3.3-5 be incorporated into the modeling discussion earlier in this chapter. It is important for the reader to understand that each trace has the same 85 values as the other traces, but each one starts with a different year and wraps through all other years.

91 cont'd below paragraph 2: It might be useful to explain why the 90th percentile does not change over time while the 50th and 10th do. As with paragraph 1, above, it may be appropriate to have a section describing more fully what is happening in these graphs. An attachment might be the best place to put such an explanation, with example graphs.

85: The referenced statements are appropriately located in the second paragraph of Section 3.3.4.2.3 (for Lake Powell) and the second paragraph of Section 3.3.4.4.3 (for Lake Mead).

86: As noted in Section 3.3.3.3, lakes Mohave and Havasu will continue to be operated in accordance with their existing rule curves. As such, the operating range of the water surface elevations and transit times of these two lakes are not expected to be affected. Additionally, the potential increase in transit time of lakes Mead and Powell are unlikely to affect productivity.

87: This information has been added in Attachment J.

88: The Shortage Protection Alternative was not analyzed differently. The referenced paragraph provides an explanation of the derivation of the shortage protection lines, used in all of the alternatives and baseline to determine when shortages occur.

89: The first paragraph of DEIS Section 3.3.4.2.3 states that the elevation at the end of the calendar year is near the seasonal low. Typically, the lowest end-of-month elevation for a year occurs between December and March.

90: The referenced discussion on the 85 traces is also addressed earlier in the chapter in Section 3.3.3.5, third paragraph. "Trace" refers to the output of a particular simulation, where the assumed inflows were derived using the indexed sequential method.

91: The fourth paragraph of Section 3.3.4.2.3 (for Lake Powell) and the third paragraph of Section 3.3.4.4.3 (for Lake Mead) have been expanded to provide additional explanation on the trending tendency of the 90th, 50th and 10th percentile lines. Specifically, the 90th percentile Lake Powell elevation does not change over time, indicating that Lake Powell is essentially full for 10% of the traces in all years.

91 cont'd As far as the results shown in this paragraph, and the figure, the important point is that the lake level declines over time, and the range of potential levels increases significantly on the lower ends, but not on the upper end. All water levels, high, low or moderate are temporary, and of course these do not reflect the within-year fluctuations.

92 Page 3.3-18, 3.3.4.2.3
paragraph 2: All modeling for levels is done at the end of the year as shown in Figure 3.3-6. The 90th percentile is at approximately 3685 feet. This paragraph brings in a new figure (Figure 3.3-7) with a modeling point of July, when the water level is highest in Lake Powell. These two figures are not comparable and serve to confuse the reader. One modeling point should be chosen for these analyses. This applies to page 3.3-21, Table 3.3-5 and its explanation also.

92: The analysis of elevation 3695 ft msl is included to address the probability of Lake Powell filling each year. This would typically occur during June or July. For the FEIS, all analyses of Lake Powell elevations were changed to a common point (end-of-July).

93 Page 3.3-19, 3.3.4.2.3
paragraph 2: What is the significance of elevation 3590 for Lake Powell. The minimum power generation level is 3490 feet, is that what you intended to look at? This applies to page 3.3-19, Figure 3.3-8 and page 3.3-21, Table 3.3-6 also.

93: For the DEIS, the Lake Powell water levels observed for the baseline and surplus alternatives did not fall below 3550 feet. An analysis of the frequency of Lake Powell water levels falling below 3590 feet was included in the DEIS to provide a bottom range for the observed water levels. For the FEIS, this analysis was replaced with an analysis of elevation 3612 feet, below threshold elevation for marina and boat ramps.

94 Page 3.3-19, 3.3.4.2.4
paragraph 1: Water levels fluctuate between 100% of possible elevations, not between 80%. All water levels are temporary, not just those in the upper and lower 10%. Please revise this paragraph to express this.

94: This comment appears to be directed toward 3.3.4.2, 4th paragraph. 80% of the simulated end-of-July Lake Powell elevations lie between the 90th and 10th percentile lines.

95 Page 3.3-23, 3.3.4.4.1
paragraph 3: Please note in this paragraph when Lake Mead reaches its minimum levels.

95: Section 3.3.4.4.3, paragraph 1, states that Lake Mead water level generally reaches its annual low in July.

96 Page 3.3-25, Figure 3.3-12
The level for the 90th percentile appears to be close to the lower level for the 1.5 maf flood pool (1219.61 feet). What is the actual level for this percentile? Again, an explanation of why this percentile does not change would assist in understanding the modeling.

96: For the FEIS, the 90th percentile of the modeled Lake Mead water surface elevation monthly values ranged between 1215.19 feet msl in 2002 to 1210.67 feet msl in 2050.

97 Page 3.3-26, 3.3.4.4.3
paragraph 1: The difference between the modeling effects and seasonal changes in elevation are well mentioned in this paragraph. This bringing together of more than just the raw results of the models should be used more throughout the document to assist the reader in understanding the implications of this. For example, because the lake levels are lower in July than when the modeling was done, there is a greater chance of breaching one or more of the target trigger elevations than may be accounted for in the analysis. The tiers discussed in the section on the alternatives could be violated over the course of the year by the fluctuation of the reservoir. Power generation is very important during the hot summer months, and that is an area that could be more affected than perhaps the models suggest.

97: Much of the analysis in the FEIS uses end of December elevations for Lake Mead and end of July elevations for Lake Powell. Reclamation agrees that probabilities of remaining above various water surface elevations would be different during times of the year other than discussed in the FEIS. However, differences between alternatives and baseline conditions would be similar.

98 paragraph 3: Water levels fluctuate between 100% of possible elevations, not between 80%. All water levels are temporary, not just those in the upper and lower 10%. Please revise this paragraph to express this.

98: 80% of the modeled end-of-December Lake Mead elevations lie between the 90th and 10th percentile lines.

15

99 paragraph 6: What is the significance of the 1200 foot elevation? Because it is below the 90th percentile, it would be expected that there would be a greater than 10% probability of water levels being higher than it. What is the point of this discussion? Further, if there is a change in the percentages from 22% to 16%, this raises the question of why the 90% line still does not change over time.

100 Page 3.3-27, Figure 3.3-14
Please change the color pattern on the figure data lines to the same as used in the other figures.

101 Page 3.3-29, Figure 3.3-16
Why does this Figure use a different scale than 3.3-15? Since they are dealing with the same concept and are within the same range of values, please use the same scale.

102 Page 3.3.4.4.4
What is important to note is not only the decrease in probabilities that a certain level will be maintained, but also that it happens much sooner under the more liberal surplus alternatives. This actually increases the number of years of risk, which increases the opportunity to have it happen. This increase, as well as the numerical changes, should be documented in this section.

103 Page 3.3-31, Table 3.3-8
Please explain how the figures for 2050 rise for all but the no action alternative.

104 Page 3.3-32, 3.3.4.5
A general comment on this section is appropriate. The discussion of the modeling and analysis in this section is not as clear as it is in other sections, especially the previous one on lake elevations. We understand that this type of analysis can be difficult to put into comprehensible terms, but as this is critical to the understanding of the effects, we believe another effort should be made to revise this section.

105 paragraph 2: Please note in which tables this information appears. There are many tables and graphs in this section. It may also be useful for the reader if the seasonal differences in flow magnitudes are more fully explained.

106 Page 3.3-34, 3.3.4.5
paragraph 1: Please separate the portion of this paragraph dealing with the second type of analysis from the rest. It will be easier to locate. Since both of these use exceedence frequencies, please explain how they are different or what different results are highlighted. A form of exceedence frequency was used in the lake elevation portion of the analysis. How is this form different? At the least, the need to change to "less than or equal to" from "greater than or equal to" should be explained. This type of modeling may also benefit from having a longer explanation, with examples, in an attachment to the document. Further, because this is the method described first in the results, it should be mentioned first. Alternatively, the discussion of each method should be included with the needed results and explanation.

99: The 1,200 foot Lake Mead elevation represents the elevation where Lake Mead is essentially full and is also below the top of the raised spillway. This has been included in the FEIS. Figure 3.3-14 presents the percent of the traces that had elevations equal or higher than elevation 1,200. The 90th percentile line depicted on Figure 3.3-13 shows where the top decile of the modeled values lies. Both figures present specific statistics that are accurate and relevant.

100: The color pattern on Figure 3.3-14 has been changed as suggested.

101: The vertical scale is varied to focus the presentation of the results to the range of values observed under the respective modeled conditions.

102: Comment noted. The timing is clearly shown in Figures 3.3-14 through 3.3-16.

103: Table 3.3-8 provides a numeric summary of the data presented in Figure 3.3-14. Values in Table 3.3-8 all decrease between 2016 and 2050. Hydrologic fluctuations contribute to the minor variability of charted values near 2050 in Figure 3.3-14.

104: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results.

105: Subsections 3.3.4.5.1 through 3.3.4.5.4 refer to individual tables and graphs. The paragraph discussed in the comment is a general description of the analysis in these subsections.

106: This paragraph has been divided into two, with the cumulative distribution function discussed first, in order to parallel subsequent text.

16

107 Page 3.3-34, 3.3.4.5.1
paragraph 2: Please provide a definition for "mean monthly flow" data in the Glossary. Is this the average flow per month, or the average total flow for month? It also might be useful in this section to expand on the statement that there are hourly, daily, weekly, monthly and seasonal changes in flows released, as well as attenuation in these changes downstream from the release points. It might also be useful to reiterate that the 400,000 af in change in point of diversion transfers are included in some alternative analyses and not in others. The justification for this should have already been made.

107: A definition for the term "mean monthly flow" has been added to the glossary. In the FEIS, all alternatives included the tranfers.

108 Pages 3.3-35 to 3.3- 36, Figures 3.3-18
At the scales used in these figures, it is difficult to assess any changes to flows that result from the different alternatives, except at a recognizable break point. Perhaps scales could be changed to allow the tracks to be seen more clearly.

108: There is relatively little difference in the magnitude (Y-axis) of the mean monthly flow values and excess flows under the baseline and surplus alternatives. Figure 3.3-18a through Figure 3.3-18d and the other similar figures depict this. There are some differences in the frequency (X-axis) of excess flows in the winter season as represented by January for modeled year 2015 as depicted by Figure 3.3-18a. However, the differences in the frequency (X-axis) of excess flows in the other seasons are minimal to none, as depicted by Figure 3.3-18b through Figure 3.3-18d. In the FEIS the size of the data markers have been reduced and the size of the graphs were increased.

109 Page 3.3-37, 3.3.4.5.1
paragraph 1: This paragraph is a prime example of where more information and analysis of the results of modeling should be provided to the reader. The numbers generated from the models should be provided. There is no defined connection that the high flows in the figures are flood flows, so the statements about the changes in flood flow releases does not appear to be supported. There should also be a discussion of where the magnitude of flood flows is shown, and how these do not decline even if there is a decrease in the flood probability.

109: Flows greater than 20,000 cfs are typically due to flood control relases, not downstream demands. This has been noted in Section 3.3.1.2 and 3.3.4.5.1.

110 Table 3.3-13 appears to be related to the second form of analysis, not the first since it contains more exceedence levels than mentioned were present in the text. This confuses the reader. There are other issues as well. This is where an understanding of what the "mean monthly flow" is essential. The other analysis looked at four months, none of which correspond to this. The highest flows shown here, the maximums, are significantly higher than anything shown in Figures 3.3-18a-d. There is no explanation of what the flows in the table mean, why minimum flows higher for the liberal alternatives than the baseline after 2015 when there are no surplus criteria, and why the maximum flows go up when flood releases have decreased due to lower lake elevations.

110: The introductory text has been modified to include the additional percentiles (Section 3.3.4.5). The maximums may not occur during the four months shown in the figures. Hydrologic fluctuations contribute to the minor differences in the maximums.

111 Page 3.3-38, 3.3.4.5.2
paragraph 1: Since the 4.4 Plan cannot be accomplished without the surplus criteria being in place, the argument in this paragraph is not supportable. Further, this question should have been addressed much earlier in the DEIS.

111: Section 1.4.1 discusses the relation between the California Colorado River Water Use Plan and interim surplus criteria.

112 paragraph 3: The Flood Control Alternative should be modeled as are the Six States, California and Shortage Protection alternatives if is to be considered a valid alternative for the purpose and need of the action.

112: In the FEIS, the Flood Control Alternative includes implementation of the California Colorado River Water Use Plan. See response to Comment 37-11 for additional discussion.

113 Pages 3.3-39 to 3.3-40, Figures 33.19a-d
We have the same comments on these figures, and the analysis in the text that we had for the preceding section on the Hoover to Parker reach.

113: See response to Comment No. 57-108.

17

114 Page 3.3-41, Table 3.3-6
This table should be 3.3-14, not 3.3-6. We have the same comments on this table, and the analysis, that we had for the preceding section in the Hoover to Parker reach.

115 Page 3.3-41, 3.3.4.5.3
paragraph 2: The Flood Control alternative should incorporate the 400,000 af in transfers from the 4.4 Plan. Also, the last sentence brings up the new issue of flows being within the range of historic flows in this portion of the river without examining the change in likelihood of the flow occurring, or an increase in the number of years that flow could occur. There is also the effects to groundwater from these changes in the flows, and this could have significant effects to riparian vegetation in the floodplains. These are effects that were part of the lake elevation analysis, and should also be addressed here. This is another example of the lack of analysis provided by this document to enable the reader to understand the effects to the river area..

116 Pages 3.3-42 to 3.3-43, Figures 33.20a-d
We have the same comments on these figures, and the analysis in the text that we had for the preceding section on the Hoover to Parker reach.

117 Page 3.3-44, Table 3.3-15
We have the same comments on this table, and the analysis, that we had for the preceding section in the Hoover to Parker reach.

118 Page 3.3-44, 3.3.4.5.4
paragraph 2: From the figures, it would appear that the highest frequency for flood flows is under the Flood Control alternative, not the Shortage Protection.

119 Pages 3.3-45 to 3.3-46, Figures 33.21a-d
We have the same comments on these figures, and the analysis in the text that we had for the preceding section on the Hoover to Parker reach.

120 Page 3.3-47, 3.3.4.5.4
paragraph 1: While the frequency of flows to Mexico may be higher in the baseline condition until 2015, it is lower for liberal surplus alternatives during the same time period. This is because Mexico can only get a surplus when the extant flood control criteria kick in, a situation based on water levels being higher than the flood storage levels needed.

121 Table 3.3-16: We have the same comments on this table, and the analysis, that we had for the preceding section in the Hoover to Parker reach. Also, the explanation for the zero figures in
122 many of the columns does not make sense. If you have 10 af/month, how can it round down to zero? This is why an explanation of what mean monthly flows are would have been helpful earlier.

114: The numbering of Table 3.3-6 in section 3.3.4.5.2 has been changed to Table 3.3-14. Also, see response to Comment 57-110.

115: In the FEIS, the Flood Control Alternative was modeled using California intrastate transfers. See response to Comment 37-11 for additional discussion. The difference in flows between historical conditions and surplus alternatives is minimal, and does not warrant the analysis proposed.

116: Also, see response to Comment 57-108.

117: Also, see response to Comment 57-110.

118: Excess flows are expected to occur more frequently under the Flood Control Alternative than under the other alternatives. Subject paragraph has been modified to reflect this.

119: Also, see response to Comment 57-108.

120: Section 3.16 contains a more detailed discussion of flows entering Mexico.

121: Also, see response to Comment 57-108.

122: Analyzed flows were actually zero. The minimum 10 af/month (approximately 0.168 cfs) amount was added to keep the model and post-processing from yielding an error message if the algorithm or equation involved dividing by the river amount (i.e., you cannot divide by zero). The note has been removed to avoid confusion.

3.4: Water Supply

123 General Comment: This section also lacks an interconnected interpretation of results of the analysis of effects. Different sections are not integrated to provide an understanding of how the various results work together to provide the analysis. Issues such as likelihood of shortages are discussed in the water use projection process before the results of the analysis are presented. This section needs rewriting for clarity and usefulness to the reader.

124a Page 3.4-1, 3.4.2
paragraph 1: All future depletions should be considered as cumulative effects and not a
124b part of the baseline. How much of the presently unused water is not covered by a valid water service contract (Lower Basin only)?

125 Page 3.4-4, Figure 3.4-1
We assume that Arizona's (and in similar graphs, California's and Nevada's) projected use of surplus water past 2015 represents their desires and not any probability of that water being available.

126 Page 3.4-5, 3.4.3.2
paragraph 1: The information on CAP allocations falling is not presented in Figure 3.4-1. Why does CAP decline after 2020?

127 paragraph 2: We suggest that the surplus depletions be given as the amount over the 2.8 maf allocation. Saying the surplus depletions are, for example, 2.96 maf instead of 160,000 af implies that the surplus amount is 2.96 maf. Why does the first level shortage condition rise over time? Is this a result of the increased probability of shortages?

128 paragraph 4: Since the non-Indian agricultural CAP users are not at present pumping groundwater (since they have CAP available), groundwater levels should be stabilizing or rising. Stating that any future use would increase the overdraft does not take into account this fact, or the other management activities taking place in groundwater management areas.

129 Page 3.4-7, 3.4.3.3
paragraph 1: Earlier in the DEIS, it said that surplus conditions were declared in 1998-2000. This paragraph implies there were surpluses in 1996-97. More importantly, California was able to get the 800,000 af of water it needed to keep MWD's aqueduct full under the current surplus water criteria. If this is the case, and over the next 15 years the amount California needs to make up decreases due to implementation of the 4.4 Plan, why are additional, more liberal criteria needed at all? This also brings up why an alternative that just provides the necessary amount of water each year to keep MWD whole is not included in the DEIS.

130 cont'd below paragraph 2: California growth, as stated clearly here, is going to increase. In order for it to do so, water must be made available to support the growth. Even maintaining the existing rate

123: The DEIS and FEIS identified specific resources that could potentially be impacted by the implementation of the proposed interim surplus criteria. Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results. Sections presented in the FEIS adequately describe these resources; associated analyses adequately address the potential impacts.

124a: Reclamation does not agree with this comment. The baseline alternative approximated the expected conditions without the project (interim surplus criteria). The potential impact that may result from the proposed interim surplus criteria can only be attributed to the difference in conditions between the baseline and the respective surplus alternative.

124b: The state of Arizona is the only Lower Basin state that has apportionment water that is currently not covered by a service contract. However, the exact amount is currently under dispute.

125: Figures 3.4-1 through 3.4-4 depict the respective state/basin's projected Colorado River water demand schedules under normal, surplus and shortage conditions.

126: Additional language has been added to the seventh paragraph of Section 3.4.3.2.

127: The discussion centers on the full surplus schedule, not the amount over the normal schedule. The 1st level shortage schedule for Arizona has nothing to do with the probability of shortages. It is derived by subtracting the amount CAP would be shorted under a level 1 shortage form 2.8 maf.

128: Comment noted; the paragraph has been restated.

129: Comment noted; the paragraph has been restated. Surplus criteria were developed to cover a wider range of hydrologic conditions than those between 1996 and 2000. Also, surplus conditions will benefit all Lower Basin States, not just the Metropolitan Water District.

130: Please see Section 1.1.3 for a description of the purpose and need for this action.

130 cont'd of growth will take more and more water. Additional supplies from the Colorado River are not available except under surplus conditions, and beyond 2020, the likelihood for surplus decreases. There are issues of indirect effects and cumulative effects inherent in the statements in this paragraph that need to be addressed.

131 paragraph 3: As we have noted previously, the certainty of the determinations of a surplus being made are not changing because they are still based on inflows and outflows. What is changing is the probability one will be called because of the more liberal criteria.

132 paragraph 5: MWD can take 1.3 maf per year through the Colorado River aqueduct, and they want to maintain that amount at capacity into the future. They have an allocation of approximately 440,000 af and the 4.4 Plan water transfers will give them about 400,000 af to use. This still leaves about 460,000 af to find to keep the aqueduct full. Where do they plan to get that water from? Future surpluses beyond 2015? Additional transfers?

Page 3.4-8, Figure 3.4-2

133 In this Figure, California's surplus demand projection is above 5.2 maf until about 2005. Why does it decline over this period when the normal demand projection is also declining and one would expect that additional surplus would be needed to make up total demand. Since the 4.4 Plan will not be implemented by then, is it appropriate to show demand reduced 100% to the allocation level so early?

Page 3.4-9, 3.4.3.3

134 paragraph 2: Would the Coachella Groundwater Storage Program also use surplus water? If there would need to be "unused apportionment" created to provide for the future use of this water, this needs to be addressed in this document. This is another example of the difficulty in seeing the entire effect of the surplus criteria without the companion 4.4 Plan being included.

135 paragraph 5: When was the compliance for this demonstration program completed?

Page 3.4-10, 3.4.3.4

136 paragraph 4: Please separate the 212,000 af of surplus water from the 300,000 af of Nevada's allocation.

Page 3.4-11, 3.4.3.4

137 paragraph 1: Mention any groundwater storage initiatives in Arizona or Nevada that could be used to store surplus water for future uses.

Page 3.4-11, 3.4.3.5

138 The issue of where Upper Basin future depletions should be analyzed has not yet been resolved.

131: Please see Section 1.1.3 for description of the "Purpose and Need for Action."

132: Please see response to Comment 11-11 for information on California's Colorado River Water Use Plan.

133: The full surplus depletion schedule plotted in Figure 3.4-2 of the DEIS for California was incorrectly plotted. The actual California depletion schedule that was used in the water supply analysis is presented in Table G-4 in Attachment G of the DEIS. The Lower Basin states prepared and submitted revised depletion schedules for the FEIS. This revised schedules are presented in Attachment H of the FEIS.

134: Please see response to Comment 11-11 for information on California's Colorado River Water Use Plan.

135: The referenced project was a project undertaken by the CAP, SNWA and MWD. NEPA documentation was accomplished for the demonstration project (indirect recharge) by a CEC (LC-93-9) dated April 9, 1993, and amended by CEC (LC-95-10) dated March 30, 1995.

136: The full surplus schedule specifies the total amount of water to be delivered under full surplus water supply conditions. The delivery of limited surplus amounts are also possible. The amount above the normal depletion amount under limited or surplus water conditions is variable.

137: The State of Nevada has not provided specific details on initiatives or programs for groundwater banking in Arizona. Based on information available to Reclamation, the concept of Nevada-Arizona interstate banking appears to be highly feasible, although currently at a conceptual stage.

138: Please see response to Comment 57-10 for a discussion of Upper Basin depletions.

20

Page 3.4-13, 3.4.4

139 A general comment on this subsection is to make sure all line patterns are consistent throughout the figures, and many of the graphs are at a scale that makes reviewing differences between alternatives difficult.

140 paragraphs 3-4: The two methods of presenting the data appear to be similar to those used in the river reaches sections earlier in the DEIS. Is this correct? If so, comments referencing those methods will also hold true for this section. Further, there appears to be little integration of the results of the two methods in this section. The results are presented without suitable interpretation.

Page 3.4-14, 3.4.4.1.1

141 In Figure 3.4-5, Is 90th percentile line derived from the surplus depletion line in Figure 3.4-1? How can the 90th percentile line remain so high, and indeed, raise over time, if the amount of surplus available in the future declines due to Upper Basin depletions? Why does the median line show such a precipitous drop near 2045 when the graphs for Lake Mead do not reflect this type of decreased water availability. Is this a result of the steadily decreasing Mead levels finally triggering a change in the median? Is that why the 10th percentile line drops earlier? Why does the median and 10th percentile line match up after 2044?

Page 3.4-15

142 paragraph 1: As asked previously, why does the 90th percentile line increase and not decrease over time.

143 paragraph 2: Why does the 50th percentile line drop so precipitously after 2044?

Page 3.4-17, 3.4.4.1.1

144 Please provide more detail on the differences in effects between baseline and surplus alternatives in this section. The fact that decreases in probability occur earlier is as important as the level attained and this is not fully acknowledged here. This section should also allow for integration of the results of other modeling as appropriate with the findings here. That the percentile lines "coincide" with the proposed depletion lines should also be addressed here if it has not been earlier.

145 paragraph 5: In Table 3.4-1, the columns for Normal and Shortage years are clearly additive percentages. The Surplus percentages are a subset of the Normal year, correct? If so, is the Surplus percentage provided a percentage of the Normal years, or is it the percentage of Normal years in which a surplus is expected. For example, under baseline conditions in 2016 to 2050, Normal conditions occur in 70% of the 35 years and shortage in 30%. Is the surplus 26% of the 35 years (which would mean that normal years occurred in 44% of the 35 years), or is it 26% of 70%?

139: The scales and units used on each figure are clearly marked and readable. The vertical scale on various figures are varied to focus on the range of the data being presented. The line patterns on all figures have been reviewed and made consistent for the FEIS.

140: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results.

141: This analysis first ranks the outcome for the 85 traces for each condition modeled. The 90th percentile line depicts the value of the upper limit of the bottom 90 percent of the modeled values (traces) in any given year. Another way to say this, is the values of 10 percent of the outcome (traces) in a given year will be equal to or greater than the value depicted by the 90th percentile line for that year. The median values are represented by the 50th percentile line. The median value represents the depletion amount where half of the values are above and half are below. On Figure 3.4-5 of the DEIS, the 50th and 10th percentile lines sometimes overlie each other. When this ocurs, the implication is that there is very little or no difference between the values in the bottom half of the ranked values (modeled outcome). This all relates to the distribution of the values in the outcome for each condition being modeled.

142: See response to Comment 57-141.

143: See response to Comment 57-141.

144: Additional explanation has been added to Section 3.3.and Section 3.4 with respect to the interpretation of the figures in these sections and the meaning of the analysis results.

145: The percentage values presented under the column heading labeled "Normal" in Table 3.4-1 and similar tables in Section 3.4, represent the total percentage of time that depletions under the noted conditions would be at or above the normal depletion schedule amount. The values presented under the column labeled "Surplus" represent the total percentage of time that depletions under the noted conditions would be above the normal depletion schedule amount. The values presented under the column labeled "Shortage" represent the total percentage of time that depletions under the noted conditions would be below the normal depletion schedule amount.

146 Page 3.4-18, Figure 3.4-8
There should be some discussion of what this figure shows in the text. The scale of these is also such that they are hard to read. It is obviously related to Figure 3.4-5 and this should be acknowledged.

147 Page 3.4-19, 3.4.4.2
The assumption that under baseline condition California would have to live within its 4.4 maf allocation by 2004 (when Arizona and Nevada using their full apportionments) should also be part of the explanation under California depletion graphs earlier in this section.

148 Page 3.4-19, 3.4.4.2.1
Figure 3.4-9 has several issues of concern. First, the 90th percentile line is higher than the surplus depletion line that California says it wants into the future. If California is not diverting at that level, then how can 10% of the depletions be above it? Between 2000-04, California wants more water than the 90th percentile, so would this be when some of the 10% would occur?

149 Page 3.4-22, Figure 3.4-12
It is very interesting in that it clearly shows the benefits of having surplus to extend the amount of time California can continue to use above its 4.4 maf allocation.

150 Page 3.4-23, Table 3.4-2
Why are the percentage chances for surplus so much different between the three states?

151 Page 3.4-24, 3.4.4.3.1
Figure 3.4-13 has the same basic questions under Nevada as it does for Arizona and California.

152 Page 3.4-25, 3.4.4.3.1
paragraph 3: Why does the surplus probability vary so much between the States? Is it based on the depletion schedules?

153 Page 3.4-27
paragraph 2: Where in the document was Nevada's use of unallocated Arizona water in the first three years discussed?

154 Page 3.4-29, Table 3.4-3
Why is the surplus probability 91% under Nevada but not as high for California and Arizona?

155 Page 3.4-29, 3.4.4.5
paragraph 1: Why was the basis for modeling Mexico's flows at 1.515 maf not addressed earlier in the DEIS under the modeling assumptions?

146: Paragraphs 1 through 4 in Section 3.4.4.1.2 include the subject discussion.

147: Figures 3.4-9 through 3.4-12 present the outcome of the modeling results in terms of the frequency and magnitude of surplus condition water supplies available to California under the baseline and surplus alternatives. California has developed a Colorado River Water Use Plan (the "Plan"). The Plan is a framework by which programs, projects, actions, policies and other activities would be coordinated and cooperatively implemented allowing California to meet its Colorado River water needs within its basic apportionment in Normal years. See response to Comment 11-11 for additional information on California's Colorado River Water Use Plan.

148: See response to Comment 57-133.

149: Comment noted.

150: We assume that you are referring to differences between Tables 3.4-1, 3.4-2, and 3.4-3. There are a number of reasons for the differences. First, there were inconsistencies in surplus depletion schedules between alternatives in the DEIS. This has been corrected in the FEIS. Second, Arizona has not reached full use of its apportionment, and it was assumed that California would thus be able to use additional water. Third, there were typographical errors. These three tables have been modified in the FEIS.

151: Section 3.4.4.3.1 describes Figure 3.4-13. Also, please see the response to Comment No. 57-141.

152: See response to Comment 57-150.

153: Nevada currently uses all of the Colorado River water apportioned for use within the State of Nevada. Arizona's depletion schedule in the DEIS indicates that Arizona does not anticipate using its entire Colorado River water apportionment until 2005. During this period, the difference between Arizona's normal apportionment and the scheduled depletion is classified as unused apportionment water. This unused apportionment water is made available to the other Lower Division states if a demand for such water exists. Text discussing this use has been added to Section 3.4.3.2. In Attachment H of the FEIS under the discussion entitled "Normal depletion schedules with and without Calfiornia transfers" this text has been added explaining Arizona's unused apportionment.

154: The percentage values for Nevada under baseline conditions and the Flood Control Alternative in DEIS Table 3.4-3, Years 2001 to 2015, are incorrect. The correct values should have been 50 percent under baseline conditions and 52 percent under the Flood Control Alternative. This information will be updated for the FEIS using the new modeling output for the baseline and surplus alternatives.

155: This additional modeling detail has been added to the modeling assumptions listed under ^Assumptions Common to Baseline and All Alternatives^ in Section 3.3.3.3.

22

156 Page 3.4-30, Figure 3.4-17
Why does the 50th percentile line drop so quickly under the baseline condition, when the levels of Lake Mead remain high?

157 Page 3.4-32, 3.4.4.5.2
This section needs to explain more fully the change in probability for Mexico to obtain a surplus, and why the shortage line does not get lower. Shortage conditions for Arizona and Nevada are shown in the respective graphs for those states.

158 Page 3.4-34, Table 3.4-4
As in the other tables of this type, please provide more information in the text about the meaning of the changes in percentages. Are these surplus percentages percent of years or of the normal percentage? What does this change really mean to flows below Morelos Dam?

Water Quality

159 Page 3.5-1, 3.5.2.1
paragraph 1: The reason for the 2015 date should be noted here. It may be confused with the expiration date of the surplus criteria.

160 Page 3.5-6, 3.5.2.2.2
paragraph 6: It might be worth noting that there are no return flows to the Colorado River from the major depletions of water to MWD, CAP, IID and CVWD.

161 Page 3.5-7, 3.5.2.2.3
paragraph 4: Costs of implementing additional salinity controls apply to any increases that result from the surplus criteria or the water transfers.

162 Page 3.5-8, 3.5.1.2
paragraph 1: The explanation in this paragraph is unclear. The 2nd sentence should end with "than under the baseline." The remaining explanation is difficult because the source of the numbers is not given, nor is the rationale fully developed.

163 Page 3.5-9, Table 3.5-1
Please explain why the Shortage Protection has a -3 under Imperial Dam when the other two liberal alternatives have +4 and +1 respectively? Why do these three figures differ?

164 Page 3.5-11, 3.5.2.3.6
paragraph 1: What about over the 2016-2050 time period?

165 paragraph 3: Are there any studies for these areas as were referenced in paragraph 2?

156: The probability of surplus water deliveries to the Lower Basin states and Mexico is highest in the early years due to the starting high reservoir conditions that were modeled. To a lesser extent, this is also affected by the increasing total basin depletions. It should be noted in the DEIS from Figure 3.3-13 that Lake Mead elevations decrease over time in all alternatives. Figure 3.4-30 is in reference to Mexico's modeled annual depletions under baseline conditions and shows Mexico's annual treaty depletion over time.

157: The effect of interim surplus criteria on the delivery of surplus flows to Mexico is best depicted by Figure 3.4-18 (for years 2001 to 2015) and Figure 3.4-19 (for years 2016 to 2050) in the DEIS. This information is also summarized in Table 3.4-4. The Colorado River water supply deliveries to Mexico never dropped below 1.5 maf under the modeled conditions and as such, the respective figures depict this.

158: See response to Comment 57-145. The FEIS results show a potential for a small reduction (3 to 6 percent) in the frequency of excess flows under the Basin States, Six States, California and Shortage Protection alternatives and a potential for a small increase (1 percent) in the frequency of flows under the Flood Control Alternative, when compared to the baseline conditions for year 2016.

159: The text has been revised in the FEIS to provide clarification.

160: Comment noted. However, Reclamation does not believe that this information would aid in understanding the flow system of the river at this point in the discussion.

161: Reclamation has considered this request; however, because modeling conducted for the FEIS indicated a general reduction in salinity under each of the alternatives it was determined that this information was not necessary. The effects of transfers associated with Secretarial Implementation Agreements will be considered under separate NEPA compliance.

162: The referenced paragraph has been revised for clarification.

163: Note that the information in Table 3.5-1 has been updated with modeling conducted for the FEIS.

164: Because of the uncertainty of the long-range salinity control projects, projections of future control projects that may be necessary to offset the effects of future water development beyond 2015 have not been made by the Forum. Note that modeling for the EIS considers only those salinity control programs currently in place.

165: Reclamation is not aware of any studies of damages in localized areas such as Laughlin.

166 Page 3.5-16, 3.5.3.2.1
paragraph 1: What is the significance of elevation 1205?

167 Page 3.5-18, Table 3.5-5
This table should be placed closer to the beginning of this section for ease of understanding the dynamics of the reservoir.

168 Page 3.5-22, 3.5.3.3.1.2
New riparian development at the mouths of tributaries will use more water than at present, thus potentially reducing inflows even further. Water quality under this scenario may not improve as stated in the text.

169 Page 3.5-22, 3.5.3.3.2
This section is extremely important to the later discussions of effects to important resources and should be more fully explained and used in those discussions.

Riverflow Issues

170 This section needs to address more fully the effects to water surface and groundwater elevations below Hoover, Davis and Parker Dams that result from the interim surplus criteria combined with the water transfers from the 4.4 Plan. This lack of discussion does not allow for a full evaluation of the effects.

171 Page 3.6-4, Table 3.6-1
At least for the 2000-2015 period, it might be instructive to break the time period into 5 year increments to examine when the changes to probabilities do occur. If the largest drop is within a certain segment, then there may be greater potential for adverse effects to the beach building and maintenance program than may appear from the table data.

172 Page 3.6-6, Table 3.6-2
Please explain more fully the results posted in this table. What causes the decreased probability for the liberal alternatives? Is this the result of less equalization flow needs? Why is this table based on water year, not end of year data and does that have an effect on the results?

173 Page 3.6-6, 3.6.4.1
Flooding in the river below Hoover Dam include more than only high damaging flows. Any amount of flow over the minimum needed to meet downstream needs has an effect on the physical and biological character of the river ecosystem. Some of these effects are beneficial, some are not, but the changes to all flows that result from this project deserve equal consideration. This section needs to be revised to reflect that.

174 paragraph 2: This is the first mention of the Colorado River Floodway Protection Act and its requirements for maintaining certain floodway levels. This should be more fully explored in light of the reduction in flows foreseen under the proposed project.

166: Elevation 1,205 feet msl is the Hoover Dam spillway crest as identified in Table 3.5-3.

167: Comment noted. The table is located in the appropriate section.

168: Discussion in referenced paragraph has been revised to incorporate this information.

169: Note that additional information has been included in Section 3.5.3 and Reclamation believes that the information presented in the FEIS appropriately identifies the potential water quality effects of interim surplus criteria. Potential effects to important resources are also presented appropriately in other sections of the FEIS.

170: Section 3.6.4 presents analysis of the potential for high flows (based on defined flow thresholds) below Hoover Dam with reference to the potential for causing flood damage, and is not intended to describe the general effects of river flows on resources within the river corridor. As discussed previously, Section 3.8 of the FEIS has incorporated summary information from the BA for interim surplus criteria regarding potential effects from changes in flows on special-status species and their habitat between Hoover Dam and the SIB. Reclamation is also consulting with your agency on the effects of approving the water transfers proposed by California's Plan.

171: A plot of annual BHBF probabilities has been added to Section 3.6.2.

172: The decreased probability of 8.23 maf release years for the "liberal" alternatives is a result of their increased probability of surplus, which results in releases from Glen Canyon Dam in excess of 8.23 maf. Table 3.6.2 is based on water year because the commitment for low steady summer flow releases is governed by annual release volumes from Glen Canyon Dam, which are accounted for by water year under the provisions of the LROC. This has been noted in Section 3.6.2.

173: See response to Comment 57-170.

174: The Colorado River Floodway Protection Act addresses flooding from 40,000 cfs flow events or 1-in-100 year flow events (if greater than 40,000 cfs). It does not address smaller or more frequent events. Table 3.6-4 in the FEIS, Discharge Probabilities from Hoover, Davis and Parker Dam, shows the probabilities of various flow events, including 40,000 cfs, under each alternative.

175 Page 3.6-7, 3.6.4.1.4
High groundwater in the Yuma area is the result of what level of flows? Please relate how this groundwater problem relates to normal and higher than normal flows. A discussion of how this will change over time would be appropriate.

176 Page 3.6-8, 3.6.4.2
In Table 3.6-3, is the figure for the Six States under Hoover Dam releases of 19,000 correct? It is lower than all the others in that line, which is different than for the other release levels.

177 This table, and the accompanying text, would be more valuable if it looked at flows that were below the damaging levels of the Hoover releases. It also would be more helpful if the data here were integrated with the probabilities of Mexico getting any surplus water in those years.

Aquatic Resources

178 Page 3.7-1, 3.7-1
This section is somewhat confusing. Is it to deal strictly with non-native/sport fish concerns or is it to also address native fish? Tighter organization and focus would help this section, as would reference to some of the studies on fluctuating reservoirs that have been done that discuss effects to fish and fish habitat.

179 Page 3.7-1, 3.7.2.2.1
Please place the discussion about the structure of Lake Powell in the previous section where similar attributes of Lake Mead were discussed.

180 Page 3.7-4, 3.7.2.2.2
There are no bonytail in Lake Mead. The discussion in paragraph 2 is not relevant to Lake Mead and should be deleted. Please bring this section into the same format as the one for Lake Powell.

181 Page 3.7-4, 3.7.2.2.3
The effects of fluctuating reservoir levels on fish populations has been widely researched. Centrarchids are affected by it, especially declines during the spawning season. Any effect to striped bass reproduction may be felt by the changes in relation of spawning areas to the length of time eggs need to float to appropriate areas. The arguments in this paragraph need supporting data to be provided.

182 cont'd below Page 3.7-5, 3.7.2.3
The analysis of effects to fish populations in the reservoirs needs to focus on the changes to physical habitats from the increase in fluctuations, the timing of fluctuations, underwater topography to assess shallow habitats at varying elevations and other factors. The effects to such things as thermal refuges for threadfin shad is also critical to the sport fishery. It is also

175: Threshold flows are shown in the two bullets included in Section 3.6.4.1.4. Section 3.3.4.5 and Attachment N of the DEIS provide additional comparison of river flows below Hoover Dam.

176: Values in Table 3.6.-4 (Table 3.6-3 in the DEIS) have been revised based on modeling performed for the FEIS.

177: Comment noted. This section is intended to address the potential for damaging flows, as discussed in the response to Comment 57-170. Developing a correlation between probabilities of damaging flows and surplus water delivery to Mexico is beyond the needs for evaluating potential effects on resources.

178: Section 3.7 addresses potential effects of interim surplus criteria on lake habitat in Lake Powell and Lake Mead for both native and non-native species, and also addresses potential effects on sport fisheries within and between the two reservoirs. Section 3.8.2.3.3 discusses potential effects on special-status fish species.

179: Discussion of Lake Powell habitat is located appropriately within the document.

180: Revisions have been made to Section 3.7.2.2.2 of the FEIS to discuss that razorback sucker is the only native species with a remnant population in Lake Mead.

181: Section 3.7.2.2.3 discusses the effects of fluctuating reservoir elevations on fish populations, and additional information has been included in the FEIS. It should be noted that although it is recognized that fluctuating water levels can affect fisheries, the alternatives under consideration are expected to result in fluctuations similar to baseline conditions. Historical conditions within Lake Powell and Lake Mead have resulted in those lakes being considered extremely popular striped bass fisheries that also support populations of largemouth bass, smallmouth bass, crappie, catfish, and carp. Both lakes have shown unprecedented natural reproduction and survival of striped bass.

182: The analysis in the EIS is presented to compare the potential effects under the alternatives with those under baseline conditions. Revisions have been made to Section 3.7.3.3.1 to clarify the discussion. It should be noted that modeling indicates that although some alternatives would have increased probabilities for lower reservoir elevations, fluctuations under the alternatives and baseline conditions would be similar. It is acknowledged that management practices being developed for native species indicate a recruitment window may exist if water levels are very low and then rise suddenly. Study of these management strategies is currently underway and will continue. Information on current management strategies can be found in the BA prepared for interim surplus criteria and Secretarial implementation agreements.

182 cont'd important to note that native fishes in new reservoirs may experience a recruitment window if water levels are very low and then raise suddenly. The discussion of these issues in the DEIS is not adequate to support your conclusions.

183 Page 3.7-7, 3.7.3.2.2
This is the first example of where the lower Colorado River (below Hoover, Davis and Parker Dams) is not included in the analysis. Please correct this oversight.

184 Page 3.7-7, 3.7.3.3.1
paragraph 2: The water level fluctuations have not been described as "gradual" in the DEIS. No discussion on the speed of fluctuations has been made. Changes of 15-20 feet per month may not be "gradual" in a biological sense. The statements made here require additional supporting information, including a discussion under the effects to lake elevation and river flow earlier in Chapter 3, of changes to the speed of elevational changes due to the surplus criteria.

185 Page 3.7-8, 3.7.3.3.1
Please explain why selenium levels would not be affected. If Endrin or other toxic materials are entering the system via Las Vegas Wash, would not reduced levels of flow in Las Vegas Bay have an effect on its concentrations and dispersal?

186 Page 3.7-8, 3.7.3.3.2
There is no discussion of the river below Hoover, Davis or Parker Dams. Please correct this oversight.

Special Status Species

187 Page 3.8-1, 3.8-1
Why does this section not address species in the riverine sections below Hoover, Davis and Parker Dams? Please correct this oversight throughout this section.

188 Page 3.8.5, 3.8.2.2.1.2
paragraph 2: Under declining water levels, beaches currently used may no longer be available, and new beaches in areas not presently desirable may be subject to heavy usage. The assumption made in this paragraph is not supported. Further declining water levels may change the depth to water or other factors supporting the milkvetch, contributing to the reduction or elimination of a population. Because the changes to elevation will be occurring over a year or set of years, there may not be sufficient time for the plant to regenerate a population at the new water line, or if it does, it may be more likely to be flooded out by any sudden increase from a wet year. The dynamics of this species, and the relation to reservoir levels are not fully analyzed in this section. This discussion holds true for the Grand Canyon evening primrose, Las Vegas bear poppy and sticky buckwheat as well as the Geyer's milkvetch.

183: The FEIS includes expanded and new discussions in appropriate sections of impacts to resources below Hoover Dam.

184: The 15 to 20-foot elevation changes described in the text occur over a year, not month-to-month. The rate of fluctuations would remain approximately the same with adoption of interim surplus criteria. Section 3.7.3.3.1 has been modified.

185: Studies are ongoing to determine effects of toxins on fish, with the premise that increased concentrations show increased effects, and to determine what limits need to be enforced. Section 3.5.3 discusses potential water quality effects associated with Las Vegas Wash and Lake Mead.

186: The FEIS considers the potential effects of increases in the temperature of water released from Hoover Dam under decreased reservoir elevations on the sport fishery within the river between Hoover Dam and Lake Mohave in Section 3.7.3. Reclamation has determined that fluctuations in flows below Hoover Dam to the SIB under the alternatives would be within the historical operating range of the river and would, therefore, not affect aquatic resources within this segment.

187: Section 3.8 of the FEIS addresses species below Hoover Dam, downstream to the SIB with Mexico.

188: This section is meant only to provide existing information. The analysis on how the changes in reservoir levels might impact these plant species is included in the Environmental Consequences section.

189 Page 3.8-6, 3.8.2.2.2
There is no discussion of the river below Hoover, Davis or Parker Dams. Please correct this oversight.

190 paragraph 2: This paragraph, which references Table 3.8-2, is confusing. There are 19 species listed in the table; two of which are eliminated from the discussion because of a lack of records (which is incorrect if the lower river is appropriately added to the discussion), two others are eliminated for lack of effects, and five are in the Grand Canyon only and are covered under other consultations. This leaves 10 species. Please revise the paragraph to be more clear.

191 Page 3.8-7, Table 3.8-2
Please reorganize this table by species groups, starting with invertebrates, then reptiles and amphibians, birds and mammals.

192 Page 3.8-8, 3.8.2.2.2.1
There is a considerable amount of general information on lakeside habitats on pages 3.8-8 through 3.8-10 that perhaps would be more appropriate under its own heading at the beginning of this section. Also, this section does not contain any information on the riverside habitats along the lower river and how they would be affected.

193 Page 3.8-10, 3.8.2.2.2.1
paragraph 3: Clear and complete information on the formation and destruction of this important southwestern willow flycatcher habitat is essential to the analysis of the effects of this action. This section needs to provide more specifics on the elevations at which the habitat forms, the elevations at which it is dried out or inundated and the extent of this habitat at various new lake elevations. Why were models not run that focused on these lake elevations that created or destroyed flycatcher habitat?

194 Page 3.8-11, 3.8.2.2.2.1
paragraph 1: The discussion of the formation of riparian habitats within the lower Grand Canyon requires the same level of background as the preceding discussion of the Lake Mead delta. Why do water elevations that benefit the delta not benefit the lower Canyon?

195 paragraph 3: Marshes and backwaters along the river below Hoover, Davis and Parker Dams will also be affected by the proposed action and should be discussed here and in subsequent paragraphs.

196 Page 3.8-12, 3.8.2.2.1
paragraph 1: The last sentence does not appear to belong here.

197 Page 3.8-13, 3.8.2.2.2.1.2
Please address the presence of these species in the lower river reaches below the dams.

189: See response for Comment 57-187.

190: Paragraph has been modified in the FEIS for clarification.

191: The table, and subsequent discussion of the species, has been reorganized as you suggested.

192: The discussion on lakeside habitat and riverside habitat in the lower canyon will be presented in separate sections in the FEIS in order to clarify these two distinct areas. No additional information will be added to the existing discussion on habitat in the lower canyon and potential changes in riverside and marsh habitat as it is adequately addressed.

193: The lakeside habitat has been organized under its own headings. Riverside habitat along the lower river has been added with reference to detailed discussions from the biological assessment (BA) prepared by Reclamation for the interim surplus criteria.

194: Additional information on water levels and development of riparian and marsh habitats in the Lake Mead Delta and Lower Grand Canyon has been added to the discussion of the FEIS. This information summarizes findings from the following Reclamation report: Willow Flycatcher Disturbances, Threats and Protective Management Along the Lower Virgin and Colorado Rivers - 1997 (Reclamation, 1998).

195: Additional information on marshes and backwaters along the Colorado River from below Hoover Dam to the SIB has been added. The discussion references findings from Reclamation's BA that examines potential effects of the implementation of the interim surplus criteria on these habitats.

196: The sentence has been reworded in the FEIS.

197: See response to Comment 57-187.

27

198 Page 3.8-16, 3.8.2.2.2.1.2
paragraph 6: Is there a connection between lake elevation and breeding season for the flycatcher? The connection is for habitat formation, unless there is also a component at elevation 1192 and below to allow for saturated soils. Please clarify.

199 Page 3.8-17, 3.8.2.2.2.1.2
paragraph 2: The citation for Fitzpatrick 2000 is not in the literature cited. We are also unclear about sightings of Yuma clapper rails at the Lake Mead Delta. The reference we have is from McKernan for the Virgin River. Please clarify this point.

200 Page 3.8-18, 3.8.2.2.3
paragraph 1: Bonytail chub also eat small fish. The citation for NPS 1998 is not correctly attributed to National Park Service. Also, there are more adequate summaries of species accounts than are contained in this citation and we suggest they be used instead.

201 Page 3.8-19, 3.8.2.2.3
paragraph 1: The efforts on Lake Havasu are better referred to as an augmentation or repatriation.

202 paragraph 2: This section on critical habitat is incorrect. Critical habitat for the bonytail in the project area is from Hoover Dam to Davis Dam including Lake Mohave to its full pool elevation and Lake Havasu from Parker Dam to the northern border of the Havasu National Wildlife Refuge including Lake Havasu to its full pool elevation.

203 paragraph 3: Colorado pikeminnow were taken from Lake Mohave in the 1970's.

204 paragraph 5: Please include only those critical habitat areas that are within the project area.

205 Page 3.8-21, 3.8.2.2.3
paragraph 5: The critical habitat for the humpback chub in the project area is incorrect. The designation includes the Colorado River from Nautiloid Canyon to Granite Park in the Grand Canyon and the lower 8 miles of the Little Colorado River including the confluence with the Colorado.

206 paragraph 7: Please refer to razorback sucker populations in the lower Colorado River as well as those in the San Juan in this paragraph. Also mention the populations in Lake Havasu and in the Parker to Imperial reach.

207 Page 3.8-23, 3.8.2.3.1.1
Much of the information here is included in the preceding section and perhaps could be combined there.

198: Additional information on lake elevation and breeding season for the Southwestern willow flycatcher has been added to the FEIS. This information was summarized from information included in the BA discussed in previous responses.

199: According to information included in McKernan, 1999, individual Yuma clapper rails have been documented at the Virgin and Muddy Rivers including the Virgin River floodplain between Littlefield, AZ and the Virgin River Delta, NV, and at sites within the lower Grand Canyon. No additional information on possible sightings of Yuma clapper rail in the Lake Mead Delta is available.

200: Revisions have been made to the discussion of bonytail in the FEIS.

201: Section 3.8.2.2.3 has been revised to use the term "repatriate" instead of "reintroduce."

202: The locations of designation of critical habitat for all four fish species references the Federal Register notice (March 21, 1994), and occurrence of critical habitat in the analysis area is noted for each species.

203: This information has been noted in the FEIS.

204: See response to Comment 57-202 above.

205: See response to Comment 57-202 above. This information has been added to the FEIS.

206: This section has been modified to discuss that razorback sucker can be found in the lower Colorado River and Lake Havasu. Populations of razorback sucker within the San Juan River are outside of the area under consideration in the EIS.

207: Comment noted. However, Reclamation believes that the information is presented appropriately.

28

208 Page 3.8-24, 3.8.2.3.1.2 through 3.8.2.3.1.5
These sections should be more detailed as to how these species would be affected by the alternatives, especially the differences between them.

209 Page 3.8-24, 3.8.2.3.2
The second part of this paragraph (beginning with "Additional special..." repeats information given previously that does not need to be repeated.

210 Page 3.8-25, 3.8.2.3.2.1
paragraph 2: Riparian and marsh habitats may also be eliminated by rising levels, or those levels that go too low and dry out the site. This section on baseline needs to focus more on the opportunity for habitats to exist at the expected fluctuations, than to deal in broad generalities. The differences between it and the alternatives cannot be evaluated without being more specific. This section also does not discuss the effects to the lower river. On a species level, California black rails are not tolerant of water level fluctuations and any increase in fluctuations would reduce the suitability of habitat for this species.

211 Page 3.8-25 and 26, 3.8.2.3.2.2 to 3.8.2.3.2.5
These sections should be more detailed as to how these species would be affected by the alternatives, especially the differences between them. The analysis is incomplete without this step The issue of longer periods of lower water elevations is very important to the habitat that support these species. The discussion for the southwestern willow flycatcher would especially benefit by including more details.

212 Page 3.8-27, 3.8.2.3.3
Please include a baseline section here as for the other special status species groups. It should also be noted here that the increase in fluctuations, and lower water levels, may in fact present an opportunity to examine the potential for native fish recruitment. Filling reservoirs may provide lower predator loads initially. Further, there is spawning and some natural recruitment at Lake Mead, and the effects to razorback sucker of changing the present operation should be part of this analysis.

213 Page 3.8-27, 3.8.2.3.3.1
Reintroduction of the bonytail to the Parker to Imperial Dam reach may be affected by the changes to that reach caused by the proposed action. Additionally, the bonytail in Lake Havasu may move upriver into the river reach below Davis Dam, that will also be affected by the changes in flow.

214 Page 3.8-28, 3.8.2.3.3.3
For flannelmouth suckers the presence of the population below Davis Dam should be mentioned in the analysis. They will be affected by the change in flows. Since there will not be much by way of higher lake elevations under the alternatives, the last sentence is unclear as to intent.

208: It should be noted that the analysis considers how species would be affected by changing system conditions that could occur under baseline conditions and each of the alternatives. With regard to potential effects on special-status species, the differences between the alternatives is primarily associated with changes in probabilities for certain conditions to occur. A more complete and detailed analysis would involve extensive study of each of these species and their population dynamics.

209: Comment noted. However, Reclamation believes that the information is presented appropriately.

210: Modeling of future conditions under baseline conditions and the alternatives indicates increased potential for declining water levels at Lake Mead. Although the rate of changed potential for surface elevation reductions varies among the alternatives compared to baseline conditions, significant differences in seasonal fluctuations are not expected (or indicated through system modeling). No research directly addressing various lake levels and resulting development of riparian and marsh habitat is available. Only general historical information is available and is associated with post-drought years followed by high water years. As a result, a general approach that includes potential effects on vegetation based on the predicted declines in water levels is presented.

211: Comment noted. Reclamation believes that the analysis presented adequately identifies the potential effects of the alternatives compared to baseline conditions.

212: The discussions for effects to fish species has been reformatted similar to that for the plant and wildlife species. Effects of the alternatives to razorback sucker in Lake Mead are analyzed.

213: Flows below Hoover Dam would be within historical ranges under baseline conditions and each of the alternatives, and no impacts to special-status species fish within this segment would occur as a result of interim surplus criteria.

214: Comment noted. See response to Comment 57-213. The last sentence has been clarified.

29

Page 3.8-28, 3.8.2.3.3.5

215 Effects to razorback sucker in Lake Mead and the lower Colorado River are not addressed in this section. There are some significant potential adverse effects to this species from the proposed action and its associated actions and they need to be discussed in the DEIS. This includes the effects to Lake Mead spawning habitats and success, backwater and main channel habitat losses in the lower river, and the effects of reductions in flood flows on habitats and other competing species. Why were models for Lake Mead elevations not run using spawning habitat elevations? Selection of any elevation appears possible and is done for recreation levels.

Recreation

216 This section also does not address the effects to recreation in the lower Colorado River reaches below Hoover, Davis and Parker Dams.

217 While the data presented in this section is not immediately comparable for use with special status species, several of the ways of presenting data could have been useful. For example, there are graphs that show the probabilities of various lake levels over time that are based on protection of recreational facilities. These types of graphs and the associated tables of probabilities would also be useful in evaluating the effects to important riparian and spawning areas. The probabilities, as well as the increases in range of probabilities is very important to the analysis of more than recreational impacts.

Page 3.9-2, 3.9.2.2

218 paragraph 2: Include Lake Mead monthly fluctuations along with those for Lake Powell. Seasonal changes in fluctuations and water levels, especially during high use periods, can have large effects on recreationists.

219 Page 3.9-6, Table 3.9-2
Please clarify whether improvements are existing or proposed.

220 Page 3.9-13, 3.9.2.3
paragraph 2: Since lake fluctuations already exceed 25 feet, how much more adaptation is needed to accommodate the new levels of fluctuations?

221 Page 3.9, Table 3.9-1
It might be more correct to say that the probability evens out from 2040-2050 with the real increase occurring between 2030-2040.

222 Page 3.9-36, 3.9.5.3.1
paragraph 2: All three states in the lower Colorado River basin do creel and other types of angler use and success surveys. This is as close to direct information as is available, and may be more indicative of angler satisfaction than availability of launch facilities.

215: The analysis has been revised to discuss potential effects to razorback sucker. Ongoing efforts to protect the species under the ESA will continue under baseline conditions and each of the alternatives. Because there are no known specific threshold elevations for razorback spawning, determining the specific probabilities associated with a particular elevation could not be done. The text was revised to mention ongoing studies of the razorback sucker population in Lake Mead.

216: Reclamation has determined that fluctuations in flows below Hoover Dam to the SIB under the alternatives would be within the historical operating range of the river and would, therefore, not affect recreation within these areas. The FEIS does consider the potential effects of increases in the temperature of water released from Hoover Dam under decreased reservoir elevations on sport fishing within the river between Hoover Dam and Lake Mohave in Section 3.7.3.

217: The analysis of probabilities associated with the occurrence of reservoir elevations below specified elevations was used in the recreation analysis because specific elevations were identifed for recreation resources. Other analyses in the EIS, including the analysis done to determine potential effects on special status species, did not identify specific elevations with which to analyze probabilities. In these instances, the model projections of certain elevations, typically the median elevation in each year, were used to identify the differences between the alternatives and baseline conditions.

218: Section 3.9.2.2 of the FEIS has been revised to include the typical annual range of Lake Mead elevations. Differences between baseline conditions and alternatives shown for a single month represent differences throughout the year.

219: Table 3.9-2 indicates existing facilities with the exception of Antelope Point. For Antelope Point, proposed facilities are identified in the Development Concept Plan for the facility. A footnote in Table 3.9-2 and the written description of Antelope Point in the FEIS provide information with regard to existing facilities at Antelope Point.

220: The paragraph referenced discusses results from the Combrink and Collins study on the effects of general lake level fluctuations on reservoir facilities at Lake Powell. As stated in the discussion "if lake fluctuations 'exceed' 25 feet, special adjustments would be necessary." Although required adjustments at specific facilities are not known, such adjustments would be necessary both under baseline conditions and the alternatives.

221: It is assumed based on the comment content that the commentor is referring to the discussion below Figure 3.9-1 on page 3.9-14. Discussions of modeling results have been revised in the FEIS.

222: Relevant information on angler use and success rates at Lake Mead, Lake Powell and Lake Mohave from the appropriate resource agencies in Utah, Arizona, and Nevada has been incorporated into Section 3.9.5.. However, it should be noted that, as discussed in Section 3.9.5, catch rates are not expected to be affected by interim surplus criteria.

30

223 paragraph 3: The DEIS has not done a complete job in documenting the potential effects to sport or native fish populations that may result from the implementation of the surplus criteria. There is insufficient analysis to say what will be the effects on angler success rates.

Energy Resources

224 Page 3.10-2, 3.10.2.2.1
paragraph 3: Since Hoover Dam has the larger powerplant, why did Glen Canyon produce more power in 1998? Is this a usual circumstance?

225 Page 3.10-3, 3.10.2.2.2
paragraph 2: The operable capacity of Glen Canyon is previously stated at 1200 MW, here is it 1048 MW. Which is correct?

226 Page 3.10-4, 3.10.2.3.1
Please include in this section a discussion of the renegotiation of power contracts for Hoover and Glen Canyon and their effects to power production gains and losses. Depending on the amount of power under the contracts, there may not be any legitimate deficits in the future that could be attributed to the proposed actions. With the power generation resources already stretched during peak use periods, there may be significant monetary gains from having some additional power generated during the 2000-2015 period.

Air Quality

227 Page 3.11-1, 3.11.2.1
paragraph 2: Where were the 30 and 45 degree slopes for the reservoirs derived from?

Visual Resources

228 Page 3.12-5, 3.12.4.1.1
paragraph 1: All reservoir elevations are temporary. Average conditions are not likely to result in an increase in reservoir elevations as uses increase over time. Only high runoff years would be able to refill a reservoir.

229 Page 3.12-5, 3.12.4.1.2
paragraph 1: In the section on cultural resources, the fluctuation in Lake Mead is discussed at 10 to 75 feet. Here it is 20 feet. Please explain.

230 paragraph 2: This paragraph (and the following pages) is a good example of the type of information that could be provided for other effects sections to set the stage for the reader to understand the magnitude of the effects. We suggest that this type of approach be used in other sections. Note as was mentioned for Lake Powell in the preceding comments, that average inflow years are not likely going to raise reservoir elevations in the future.

223: Sections 3.7.3 and 3.9.5, both of which address sport fishing and the sport fishery, have been expanded. Special status fish species are addressed in Section 3.8.2.2.2.

224: The energy output of a powerplant is a function of the net effective head, the efficiency of the turbine and the quantity of water through the turbine. Obviously this changes from year to year. However, as a point of interest, the 30-year average conversion efficiency of Glen Canyon and Hoover is 463.8 kWh/AF and 456.2 kWh/AF, respectively.

225: The nameplate capacity of Glen Canyon is about 1,200 MW. Because of the flow restriction of 25,000 cfs, the powerplant can only produce 1,048 MW at maximum head.

226: This analysis does not make any assumptions related to contract renewals. However, it is possible that Western Area Power Administration would only make contract commitments when the current contracts terminate based on the foreseeable amounts of capacity and energy during the next contract term. Potential increases or decreases in revenue from changes in power production are beyond the scope of analysis necessary to appropriately assess the potential effects of interim surplus criteria.

227: Average Lake Powell and Lake Mead shoreline slopes used for the air quality analysis are based on general estimates by persons with knowledge of the terrain surrounding the two reservoirs. It should be noted that estimates were developed for the purposes of comparing alternatives to baseline conditions, and determination of the actual slope was not necessary for this comparison.

228: The temporary nature of reservoir levels has been noted in the discussion in the EIS. The increase of median Lake Powell elevations after the interim period is due to the suspension of equalization requirements as discussed in Section 1.4.2.

229: Section 3.13.4 discusses historical annual fluctuations of Lake Mead, which ranged to 75 feet. The 10 to 20 feet fluctuations discussed in Section 3.12.4.1.2 are projected based on modeling results.

230: Comment noted. Discussion of potential effects have been revised as practicable to clarify information presented in the FEIS. Note that the methodology used for analysis of various resources was dependent upon the amount of information available and the potential effects identified through modeling.

Cultural Resources

231 According to the next section, the discussion of the Tribes perfected water rights should be done here. There is no such analysis. The analysis should also note how much of their water each Tribe is using, and as part of cumulative effects, when they plan to use all of it.

Thank you for including the lower portions of the river in this discussion. Other sections have not provided this information.

Indian Trust Assets

Page 3.14-1, 3.14-1

232 paragraph 2: The discussion of where perfected water rights should be discussed is confusing. Later in this section, water rights are discussed, but how they relate to perfected water rights, amounts currently developed, under development plans for the near future or are far future uses is not clear. How Tribal water not presently used by the Tribes is accounted for in the state allocations should be discussed in greater detail here. With the considerable amount of new development being envisioned by Bureau of Indian Affairs to fill out Tribal irrigation projects, there is clearly a body of water not being used at this time by the Tribes.

Page 3.14-2, 3.14.2.1

233 What is the significance of the Northern Ute Tribe to Colorado River water in the project area and effects of this action? Is this included in the Upper Basin schedule of increased depletions?

Page 3.14-4, 3.14.2.2

234 What is the significance of the Jicarilla Apache Tribe to Colorado River water in the project area and effects of this action? Is this included in the Upper Basin schedule of increased depletions?

Page 3.14-5, 3.14.2.3

235 What is the significance of the Navajo Tribe to Colorado River water in the project area and effects of this action? Is this included in the Upper Basin schedule of increased depletions?

Page 3.14-6, 3.14.2.4

236 What is the significance of the Southern Ute Tribe to Colorado River water in the project area and effects of this action? Is this included in the Upper Basin schedule of increased depletions?

Page 3.14-6, 3.14.2.5

237 What is the significance of the Ute Mountain Ute Tribe to Colorado River water in the project area and effects of this action? Is this included in the Upper Basin schedule of increased depletions?

231: Tribal water rights are trust assets that are covered under the section on Indian Trust Assets, not under the Cultural Resources section.

232: A detailed discussion of Present Perfected Rights is beyond the space limitations available here. We suggest you read the Supreme Court Decision in Arizona v. California and supplemental decrees. Additional clarifying text has been modified in Section 3.14 to explain how Tribes water is acounted. As Tribal water is developed, and depletions in the Upper Basin increase, less water will be available for storage in Colorado River reservoirs. The modeling for the FEIS includes the increased use of water under Tribal rights over time in both the baseline and action alternatives. Modeling the increased use of water in the Upper Basin, including the Tribal water, is essential in predicting future reservoir levels.

233: The Northern Ute Tribe, located in the Upper Basin, has the right to deplete 248,943 acre-feet. At the current time, approximately 100,000 acre-feet of this water is yet undeveloped. The Northern Ute's Tribal allocation is included in the Upper Basin schedule of increased depletions, and included in the modeling process as discussed in the response to Comment 57-232.

234: The Jicarilla Apache Tribe, located in the Upper Basin has about 30,000 acre-feet of undeveloped water. The Jicarilla Apache Tribal allocation is included in the Upper Basin schedule of increased depletions, and included in the modeling process as discussed in the response to Comment 57-232.

235: The Navajo Tribe, currently has over 150,000 acre-feet of undeveloped water in the Upper Basin. The Navajo's Tribal allocation is included in the Upper Basin schedule of increased depletions, and included in the modeling process as discussed in the response to Comment 57-232.

236: The Southern Ute Tribe, located in the Upper Basin has about 30,000 acre-feet of undeveloped water. The Southern Ute's Tribal allocation is included in the Upper Basin schedule of increased depletions, and included in the modeling process as discussed in the response to Comment 57-232.

237: The Ute Mountain Ute Tribe, located in the Upper Basin has about 50,000 acre-feet of undeveloped water. The Ute Mountain Ute's Tribal allocation is included in the Upper Basin schedule of increased depletions, and included in the modeling process as discussed in the response to Comment 57-232.

32

238 Page 3.14-7, 3.14.2.6
paragraph 2: Where are the table located that show Ft. Mohave over using its California allocation? The untitled table does not appear to show that data. Will the 3,022 af of water California is proposing cover the amount of the overdraft only or will it only cover new lands? How much of their right in Arizona do they use? If not using all of it, who is at present getting the water under surplus allocation and how will that loss be made up?

239 Page 3.14-8, 3.14.2.7
The Chemuhuevi do not use much of their water right now. What is their schedule to begin using that water. Who is at present using that water, and how will that loss be made up?

240 Page 3.14-9, 3.14.2.8
How much of their water does the Colorado River Indian Tribes use as of 2000? How much more do they have available for expansion? Who is using that water now, and what will need to be done to replace that use?

241 Page 3.14-9, 3.14.2.9
Does the Quechan Tribe use all of their water in 2000? If not, when are they planning to begin using that water. Who is at present using that water, and how will that loss be made up?

242 Page 3.14-9, 3.14.2.8
How much of their water does the Cocopah Tribe use as of 2000? How much more do they have available for expansion? Who is using that water now, and what will need to be done to replace that use?

243 Page 3.14-11, 3.14.3
The Central Arizona Project is most likely to face an increase risk of shortages over the next 50 years. Indian waters that come from the CAP will be affected. The discussion here presents more details on the details of those risks, but again does not address the consequences to the Tribes of those losses.

Environmental Justice

No comments on this section.

Transboundary Impacts

244 Page 3.16-3, 3-16.3
paragraph 4: Please explain the difference between the flood control operations "excess flows" from the 200,000 af of water Mexico is eligible for from flood control releases?

245 cont'd below Page 3.16-6, 3.16.4.2
paragraphs 4-5: Please differentiate between native and non-native species in the Cienega/ Should the southwestern willow flycatcher be listed as a species that may occur or did likely

238: There is no table in the DEIS that shows the Fort Mojave Indian Reservation is over-using its present perfected federal reserved water right in California. As the table shows in Section 3.14.2.5 of this FEIS, the Tribe's right in California was limited, prior to June 19, 2000, to an annual diversion not to exceed 13,698 acre-feet. The Fort Mojave Indian Reservation's reported diversions in the Article V Decree accounting records for use in California were 21,109 acre-feet in calendar year 1999. As of June 19, 2000, the Fort Mojave Indian Reservation's present perfected federal reserved right was increased to a maximum annual diversion right of 16,720 acre-feet for use in California (see response to Comment 57-19). This additional water right will help cover the amount of the overdraft but the Fort Mojave Indian Reservation may use its 16,720 acre feet of federal reserved right available for use in California on any lands within the reservation boundaries in California. The Fort Mojave Indian Reservation's reported diversions for use in Arizona were 80,252 acre-feet in calendar year 1999. Because the Tribe's water right for lands in Arizona is part of the 2.8 maf apportioned for use in the State of Arizona, any water that is not used by the Tribe first is made available to junior priority holders in Arizona. Any water within this 2.8 maf apportionment that is not used in Arizona may be released by the Secretary under Article II(B)(6) of the Decree as unused apportionment for use in another Lower Division state. Any of this water that is delivered to a California entitlement holder is unused apportionment, not surplus water. There is no loss to make up. If a holder of a Colorado River water entitlement does not use all the water to which it is entitled in any year, that entity does not retain a right to the unused water - it remains Colorado River System water and is available for the Secretary to release for use in another state as unused apportionment or surplus water, under Articles II(B)(6) or II(B)(3), respectively, of the Decree.

239: The Article V Decree accounting records show the Chemehuevi Indian Reservation diverted 664 acre-feet in calendar year 1998 and 265 acre-feet in 1999. The Tribe has proposed to lease some of its water right. Because the Tribe's water right is part of the 4.4 maf apportioned for use in the State of California, any water that is not used by the Tribe first is available to junior priority holders in California in accordance with the priority system established for California by the California Seven-Party Agreement dated August 18, 1931. There is no loss to be made up. See the discussion under Comment 57-238.

240: The most recent Article V Decree accounting records are for calendar year 1999. As of 1999, the Colorado River Indian Tribes reported annual diversions of 599,509 and 5,791 acre-feet of diversions for use in the States of Arizona and California, respectively. These reported uses compare to the tribes' Federal reserved right maximum diversions of 662,402 and 54,746 acre-feet for Arizona and California, respectively. As for disposition if this unused water, see the discussion under Comment 57-238.

241: The Quechan Tribe did not use all the present perfected Federal reserved water rights available for use by the Fort Yuma Indian Reservation in 1999, the most recent year for which Article V Decree accounting records are available. In 1999, the annual diversions reported for the tribe were 31,350 acre-feet. See the discussion under Comment 57-238.

242: The total diversions reported for the Cocopah Indian Reservation were 11,546 acre-feet during calendar year 1999, which exceeded the tribe's annual diversion right of 10,847 acre-feet. See the discussion under Comment 57-238.

243: See response to Comment 56-6.

244: Excess flows to Mexico are defined as flows at the Northerly International Boundary (NIB) in excess of Mexico's scheduled delivery. When flood control releases occur at Lake Mead, Mexico is allowed to schedule up to an additional 200 kaf for delivery for that year. Excess flows under flood control releases are then flows in excess of that increased Mexico scheduled delivery.

245 cont'd | occur historically? Please note that the Yuma clapper rail populations in Mexico are not protected under the U.S. ESA.

Page 3.16-7, 3.16.5

246 | paragraph 1: It should be noted that Mexico will divert any excess water of any category if it has the canal space to do so. It might be appropriate to explain how that water counts or does not count against their allocation.

247 | paragraph 4: It will be Mexico's ability to schedule its 200,000 af that will be adversely affected by the proposed actions since the probability of a Lake Mead water level requiring a flood control release that decreases with surplus criteria and future upstream depletions.

Page 3.16-8, 3.16.5.1

248 | paragraph 2: The date of 2005 for Upper Basin depletions to significantly affect Mexico's surplus flows does not appear to be correct. These depletions do not become sufficiently large until well after 2015.

249 | paragraph 3 and Tables 3.16-2 through 3.16-5: The maximum annual flow given of 8.4 maf does not appear to be logical given the constraints on flow releases over the next 50 years or of the amount of water so recorded in the past. There is not 8.4 maf surplus in the system in any one year, and releases of this magnitude would wipe out the infrastructure of the river. We are unclear as to what these data tell the reader and suggest additional explanation be provided.

Page 3.16-12, Table 3.16-2

250 | The information in this table relates to the previous comment. Additional explanation as to the source of the numbers in the table and what they represent is needed for the reader to understand the information provided. The basic question of how flows of these magnitude can occur with the reductions in available flood water over time remains to be answered.

Page 3.16-13, 3.16.6.1

251 | paragraph 1: The reduction in historic river flows below the NIB is far more a factor of development of water resources in the United States than it is in what Mexico diverts every year. This should be put into perspective in this discussion. The mention of "potential magnitude" refers back to a concept that has not been adequately explained in this document and requires this explanation before it is useful.

252 | paragraph 2: It may be more correct to say that the establishment of marsh and riparian habitats below the NIB requires overbank flows that deposit sediment rather than scouring flows. Scouring flows deepen the channel, which drops the water table in the surrounding floodplain and has adverse effects to local marsh, backwater and riparian habitats. The elimination or reduction of even smaller level flows than can cause damage to structures may have a profound effect on riparian and marsh regeneration and should be considered here. This concept of the importance of lower "flood" levels has been discussed in relation to other parts of the DEIS.

245: The discussion of historical versus current habitat notes when non-native species such as salt cedar and shrimp were introduced. Occurrence of the Southwestern willow flycatcher in Mexico is noted in Section 3.16.6, as is the status of Yuma clapper rail.

246: Additional information has been added to the FEIS concerning Mexico's practice of diverting excess flows (such water does not count against their allocation).

247: As discussed in Section 3.4.4.5.2 of the FEIS, Mexico receives surplus deliveries 26% of the time for the interim surplus criteria period under baseline conditions, and 23% of the time under the preferred alternative (Basin States Alternative). As noted in Section 3.3.3.3, all alternatives and baseline used identical Upper Basin depletions.

248: As stated in the DEIS on page 3-16-8, paragraph 2, "the relatively high frequencies occurring in years 2001 through 2005 result from the current full reservoir conditions". After 2005, there is a gradually declining trend out to 2050 that is due to the increasing Upper Basin depletions.

249: Reclamation notes that in 1983 through 1987, excess flows at NIB were greater than 9 maf annually, with a maximum of 13.8 maf in 1984.

250: As discussed in Section 3.3.3.5, the range of possible future hydrologic inflows modeled includes the 1983-1987 historical inflows. Such events will cause flood control releases of similar magnitudes in the future.

251: The term "magnitude" has been added to the glossary of the FEIS to provide a definition for this tern. See response to Comment 11-18 which addresses reductions in historic river flows below NIB.

252: Reclamation assessment has been revised to discuss these concepts.

253 paragraph 4: How can the magnitude of the annual flows not change if the frequency and amounts of flow decrease? The effects of interim surplus criteria are felt the most in the next few years and that effect has not been shown to be negligible (see table 3.16-1).

254 Page 3.16-14, 3.16.6.2
The desert pupfish in the Cienega is now *Cyprinodon macularius* and the Quitobaquito form is *C. eremus*.

255 Page 3.16-15, 3.16.6.2
paragraph 6: The potential for changes to inflow via the MODE because of salinity control operations should be addressed as part of the discussion of effects to the Cienega.

256 Page 3.16-18, 3.16.6.2
paragraph 6: Please note that as of August, 2000, there is no recovery plan for the flycatcher.

257 Page 3.16-19, 3.16.6.2
paragraph 3: Are there any records of flycatchers using the Colorado River, the delta or the Cienega during the breeding season? Is it reasonable to assume they do or do not breed in the area?

258 Page 3.16-20, 34.16.6.2
paragraph 5: For a discussion of acreage changes in the last 20 years, more recent citations than 1976 and 1986 would be appropriate.

259 Page 3.16-21, 3.16.6.2
paragraph 2: A map would be useful here.

260 paragraph 3: Please note that the clapper rail is not listed by the United States in Mexico. It is listed by the Mexican government under its environmental statutes.

261 Page 3.16-22, 3.16.6.2
paragraph 1: Please note here that crayfish are not native to the Colorado River. The portions of the paragraph on page 23 that relate to crayfish may be moved here for completeness.

262 Page 3.16-23, 3.16.6.2
paragraph 1: Is the CFG Finne-Ramer unit the same as the Wister unit?

263 paragraph 2: Data from 1999 estimated the clapper rail population in the Cienega at 6,400 individuals.

253: Excess flows to Mexico primarily result from flood control releases from Lake Mead. As shown in Figures 3.16-2 through 3.16-5 in the FEIS, the surplus alternatives have annual excess flow volumes over the same range as the volumes for the baseline conditions. The differences between the alternatives and baseline conditions are in the frequency of occurrence (or probability) of excess flow volumes of a particular magnitude (e.g. 2-3% for a volume of 4 maf in year 2005).

254: This information is included in the discussion for the desert pupfish in Section 3.16.6.2.1 of the FEIS.

255: Inflow to and salinity of the Cienaga from MODE would not be affected by the interim surplus criteria.

256: The discussion of the status of the Southwestern willow flycatcher notes this.

257: Reclamation could only find documents of flycatchers being observed in Mexico before its breeding season, and believes it is not reasonable to assume they breed in the area.

258: The analysis for the FEIS focuses on acreages from a 1997 survey of floodplain vegetation in the Limotrophe Division, a 1999 study conducted by the University of Monterrey, University of Arizona, Environmental Defense Fund, and the Sonoran Institute, and a 1998 aerial survey of the Rio Hardy and Colorado rivers.

259: A map has been added to Section 3.16.

260: Comment noted.

261: Mention of when crayfish were introduced to the lower Colorado River and its role in extending the breeding range of the rail has been moved up.

262: No, they are two different areas in California.

263: This has been added to the discussion.

264 paragraph 3: Historically, clapper rails probably used the available marshes in the alluvial valleys of the lower Colorado, the mouth of the Bill Williams River and the considerable marsh habitat of the Gila River valley.

265 paragraph 4: The recovery goals for the clapper rail are being clarified by the Service based on information provided by rail experts in 1999.

Page 3.16-24, 3.16.6.2

266 paragraph 6: There has not been a final, one-year finding on the status of the yellow-billed cuckoo. The finding referred to here is the preliminary 3 month finding and this is not definitive as to the status of the subspecies.

Chapter 4: Other NEPA Considerations

Page 4-1, 4.2

267 paragraph 1: Aren't cumulative impacts the result of other activities than the proposed action that may affect the same resources? If so, the definition here is unclear on that point.

268 paragraph 2: We understand that no separate analysis of the cumulative impacts has been done, but that all future and baseline effects were carried forward in the modeling. For NEPA considerations, the origin of an action (Federal or non-Federal) is not an issue. However, it is for analyses done for the ESA under section 7. Future Federal actions cannot be considered as baseline or cumulative unless consultation has been completed for them. This is where the question of how future water depletions in the Upper Basin should be considered in this analysis. Future changes in water use in the Lower Basin, especially as regards currently unused apportionments being used by another party, should also be examined. Although this is not a NEPA question, it might be useful to the reader to include a summary of the different ways cumulative effects are defined in NEPA and ESA.

269 paragraph 3: Cumulative effects are not baseline effects. This should be made clear in this paragraph that there was a compression of the effects analysis to do all things at once.

Page 4-2, 4.3

270 paragraph 2: The benefit of the proposed action is not increasing the efficiency of the decision making process, it is to increase the availability of surplus water by redefining what is a surplus.

271 paragraph 3: Over the shortterm, decreased reservoir levels and decreased flood flows and the natural resources affected by these changes are the costs of implementing a surplus alternative.

Page 4-3, 4.4

272 cont'd below paragraph 1: The surplus criteria could only be revised to be more conservative at the 5

264: Comment noted.

265: This update has been added to the discussion.

266: Information on the legal status of the yellow-billed cuckoo has been revised.

267: As stated in the definition from the CEQ regulations, cumulative impact analyses include the proposed action and other actions.

268: Comment noted.

269: The text has been edited.

270: Increasing the availability of surplus water is not the purpose and need of the proposed action. See FEIS Section 1.1.3 for a definition of the purpose and need.

271: Comment noted.

272: Following a decision to implement one of the action alternatives, the Secretary could choose to revert to the current method for determining surplus. A subsequent decision by the Secretary to revert to the current method (i.e., the AOP process without specific interim surplus criteria in effect) would be different than selecting the No Action Alternative at the present time. The likelihood and timing of such subsequent decision is speculative and not analyzed in the FEIS. Any changes to the interim surplus criteria or the LROC at the 5 year reviews would institute the need for appropriate environmental compliance.

272 cont'd | year intervals or additional compliance would be needed. This compliance would have to be based on the present no-action alternative, not on conditions at the time of the review.

273 | paragraph 4: There is an irreversible cost in terms of recreational losses and power production, as well as losses resulting from decreased flows occurring earlier in the time period because of the new criteria.

Chapter 5: Consultation and Coordination

No comments on this section.

Supporting Materials

Glossary

274 | We suggest that more technical terms such as "annual magnitude" flows be included here. Also, that words in the glossary be highlighted in the text at their place of first usage.

References Cited

275 | Please check with L. Fitzpatrick re the information she provided to A. Pool on 14 April as there may have been a mis-communication.

276 | There is no citation for McKernan 1999 and 2000 listed here. These were cited in the Mexico section of the DEIS.

277 | Why are the references for section 3.16 separated from the others?

Attachments

278 | *Attachment A: LROC*
page 2: We assume the requirement for the 75 maf over 10 years was included in all modeling done for future conditions?

279 | *Attachment D: Surplus Criteria Proposed by Six States*
page 1: We suggest that those parts of the Six States plan that were accepted for the modeling or other consideration in this DEIS be summarized or highlighted in this attachment.

280 | page 6, item #6: This is an example for the first comment. There is nothing in the DEIS text that describes a need for California to do this.

281 | page 6, item #7: This an another example. In this case, the amount of water available to California would be limited to only that needed to provide for M&I deliveries. There is nothing in the DEIS that accepts or denies this.

273: Reclamation does not believe recreational losses would be irreversible because the reservoirs and river level are constantly fluctuating up and down over time. Lower levels may actually improve some kinds of recreation such as reservoir fishing as fish become more concentrated. Regarding power losses, power production is not a primary function of Hoover Dam. It is third on the list of dam operation priorities behind flood control/improved navigation and irrigation/domestic uses/satisfaction of present perfected rights.

274: The term "annual magnitude flows" is not commonly used in hydrology. In the FEIS, flows shown on an annual basis represent total volume over the year at the specified point.

275: The L. Fitzpatrick citation has been replaced with information from McKernan (1999).

276: Please see response to Comment 57-275 above.

277: This error from the DEIS has been corrected. These and additional references revising the transboundary impacts analysis have been incorporated into a single list of references in the FEIS.

278: Yes, the requirement was included.

279: Reclamation's Six States Alternative was derived from the Six States proposal. The alternative is as described in Chapter 2, and the assumptions used for modeling are described in Section 3.3.

280: Please refer to the purpose and need discussion in Chapter 1.

281: Please refer to Attachment H for a discussion of the water demand schedules.

282 page 7, paragraph 1: Would California use be more heavily monitored in an attempt to free up existing water currently overdrafted by other users to avoid the need for surplus?

283 page 7, paragraph B: There is nothing about Arizona waiving its 46% of any surplus in favor of MWD or Nevada in the DEIS. Since Arizona is the state with the most to lose in the event of a shortage brought on by interim surplus uses, their reasons for doing or not doing this would be complex.

284 page 9, #4: The existence of this "Colorado River Alternative Operating Strategies for Distributing Surplus Water and Avoiding Spills" should be more fully referenced in the main part of the DEIS, especially if it was instrumental in determining the surpluses from 1998-2000.

285 page 10, #5: The Six State plan would have water used for all beneficial purposes, but does not provide for a limit based on the amount of water available over the target elevation. Please explain this distinction.

286 page 12, IV: The issue of overrun accounting and the need to be especially vigilant about such, especially if this can affect future shortages, should also be noted earlier in the DEIS.

Attachment E: Surplus Criteria Proposal by California

287 page A-4, paragraph 3: It should be noted in the DEIS that while stored groundwater may save Arizona and Nevada from a shortage caused by surplus criteria implementation in the near term, it does not provide long term assurance.

288 page A-5: Please note that any increase in surplus criteria would require additional compliance.

Attachment F: Surplus Criteria Proposal by Pacific Institute

We have no comments on this attachment.

Attachment G: Lower Basin Depletion Schedule

289 Please provide page numbers for this attachment.

290 page 1, paragraph 2: Please explain why the water transfers under the 4.4 Plan were not included in the Flood Control Alternative.

291 page 1, paragraph 6: Was the determination of how much water the states would get out of surplus criteria based on how much they asked for in their future depletion schedule? If there was not enough water at the water surface elevation to meet all those needs before it fell below a target elevation, what uses would be curtailed?

282: California would be monitored for its progress in implementing its Colorado River Water Use Plan. Each of the Lower Division states would be monitored as to use of its basic apportionment and purposes for which surplus water is used.

283: Reclamation does not anticipate any waiver of Arizona's percentage right to surplus water. The percentages would apply when a quantified surplus is declared that must be divided among the Lower Division states.

284: The influence of this document is discussed in the introduction to Section 2.2.4.

285: The provisions of the Six States Alternative in this FEIS take precedence over the provisions cited in the attachment.

286: Reclamation is formulating a policy for overrun accounting which we expect will be published in the Federal Register for public review and comment. However, the matter is beyond the scope of this FEIS and is not described in this FEIS.

287: Reclamation's understanding is that conjunctive use of groundwater will play an important role in the water supply for all the Lower Division states.

288: Comment noted.

289: The depletion schedules have been replaced with revised schedules used to model the baseline conditions and surplus alternatives for the FEIS. Page numbers have been added.

290: In the FEIS, the Flood Control Alternative was modeled using California intrastate transfers. See response to Comment 37-11 for additional discussion.

291: The explanation of surplus depletion schedules provided in this paragraph has been revised to provide more clarity. Additional more detailed explanation on the modeling criteria used to determine the availability and amount of surplus water deliveries under the modeled baseline conditions and the different surplus alternatives is provided in Attachment I of the FEIS.

292 In Table G-1, are the lower Arizona depletions after 12/24 the result of Level 1 shortages that only affect CAP?

293 *Attachment H: Draft Interim Surplus Guidelines*

Please number the several sections of this attachment sequentially. The separate numbering system is difficult to use once the sections are mixed up.

294 These summaries should contain all parts of the Six States and California plans that would be incorporated into the preferred alternative.

295 Please revise the sections in the introduction to each alternative that address the greater predictability rather than the probability that results from the development of these criteria.

296 Please clarify the assumption that under all surplus declarations, there would be adequate water supplies to meet all appropriate surplus demands without falling below any designated trigger point.

297 In the Six States, California and Shortage Protection alternatives, there are tables showing amounts of water available for surplus use. Where did these tables come from and why are they not discussed in the DEIS proper? Why are they not included in earlier Attachments on these alternatives? Why is there not a set of these for the Flood Control alternative?

298 *Attachment I: Detailed Modeling Documentation*

No data were provided in this attachment. While this will be provided in the FEIS, it would be more appropriate for examination of the models if it was provided here.

299 *Attachment J: Upper Basin Depletion Schedule*

For the purposes of NEPA, it may not be necessary to divide this schedule into sections based on baseline projects, approved future projects (all compliance completed), and other future projects (compliance not completed), but for ESA this may be an issue of concern.

Attachment K: Sensitivity Analysis of Shortage Assumptions

We have no comment on this attachment.

Attachment L: Comparison of Colorado River Flows

300 cont'd below These could be very useful. We would suggest using a finer scale since most values are very close for most of the period of record. This would eliminate the appearance of a complete overlay of the alternative results. Since the effects of the action are hidden in that overlay, it

292: Attachment G of the DEIS is now Attachment H in the FEIS. The tables in these attachments represent the Lower Basin Depletion Schedules that were used as input to the model. These schedules were updated by the states in September 2000, and represent the states' projections of their future water demands under the respective water supply conditions.

293: The attachment has bee revised. The draft guidelines focus on presenting information for the preferred alternative. It is now Attachment I. See response to Comment 57-279 above.

294: The Guidelines contain detailed provisions of Reclamation's preferred plan, and is not necessarily intended to conform to the Seven States proposal.

295: As stated in the purpose and need discussion in Section 1.1.3, a greater degree of predictability is being sought for mainstream users of Colorado River water.

296: When surplus water delivery is based on a trigger elevation, the water level could drop below the trigger elevation once the deliveries are made. See also response to Comment 57-64.

297: The tables are in Chapter 2 of the FEIS. The tabulated values were produced by the operational model.

298: Copies of this Attachment were available at the technical presentation on August 15, 2000, at the four public hearings for the DEIS, and upon request. It is Attachment J to the FEIS.

299: Comment noted.

300: It is difficult to decrease the scale of these graphs without losing data. The size of the data markers has been reduced to make it easier to distinguish between alternatives. Graphs in Attachment L supplement information in the main body of the FEIS.

300 cont'd would be appropriate to display the results differently. We would appreciate seeing the data in them incorporated into the main text of the FEIS

Attachment M: Water Supply for Lower Division States

301 These larger size graphs are very useful. As with their smaller versions in the text, there are several points that need to be clarified:

-how the maximum and 90th percentile lines can overlap
-how the median, 10th percentile and minimum lines can overlap
-that time till a change in a line is an important effect of that alternative
-that minimum values occur more often under the liberal alternatives

302 Please note that the legend for Figure 1 has two maximum lines and no 90th percentile line.

Attachment N: Energy Analysis Worksheets

We have no comments on this attachment.

Attachment O: Ten Tribes Demand Point Spreadsheet

We have no comments on this attachment.

Attachment P: Public Scoping Process

We have no comments on this attachment.

Attachment Q: Consultation with Mexico

We have no comments on this attachment.

Thank you for the opportunity to read and provide comments on this DEIS. If there are any questions about these comments, or we can be of additional assistance, please contact Tom Gatz (x240) or Lesley Fitzpatrick (x236).

David L. Harlow

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ES)

301: Comment noted.

302: This correction has been made for figures in the FEIS.

Literature Cited

Hall, G.E. ed. 1971. Reservoir Fisheries and Limnology. Special publication #8. American Fisheries Society, Washington, D.C.

Ploskey, G.R. 1989. A review of the effects of water-level changes on reservoir fisheries and recommendations for improved management. Final Report. Tech. Report E-83-3, National Reservoir Research Program, Fish and Wildlife Service. For U.S. Army Corps of Engineers. Waterways Experiment Station, Vicksburg, Mississippi.

OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

SEP 08 2000

4600

Ms. Jayne Harkins
Manager, River Operations
Boulder Canyon Operations Office (BCOO-4600)
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, Nevada 89006-1470

Dear Ms. Harkins:

The United States Section, International Boundary and Water Commission (USIBWC), has reviewed the Draft Environmental Impact Statement (DEIS) for Interim Surplus Criteria for Colorado River Operation. This document was provided by letter dated June 29, 2000 (Reference: LC-2502, ENV-6.00), and our comments follow.

1 | Add **CBRFC**, and **CRSSez** to the list of the Acronyms on page ACR-1. Also, on page ACR-2, correct the entry for IBWC to read, "International Boundary and Water Commission, **United States and Mexico**."

1: The list of acronyms was amended to include CBRFC and CRSSez. The entry on page ACR-2 was corrected.

2 | Page S-7, section S.3.3, subsection Reservoir Water Levels. Correct the sixth sentence in the first paragraph to, "The other three alternatives would result in increased potential for Lake Mead water levels to decline, with median elevations between 15 feet and 27 feet lower than ...."

2: Correction made.

3 | Page 2-3, section 2.2.3, Pacific Institute Proposal. In the first sentence of the second paragraph, correct to read, "Water delivery to Mexico is regulated by the Treaty and various treaty **minutes** based on consultation between the United States and Mexico."

3: Correction made.

4 | Page 3.4-32. In the first paragraph, correct the reference to Figure 3.3-20 to read, "Figure **3.4-20** provides a comparison ...."

4: The reference has been corrected.

5 | Page 3.4-34. The entire write-up on this page seems misplaced. A more appropriate location would be on page 3.4-32 following Figure 3.4-19.

5: The text is arranged to accommodate the placement of figures in the respective section and to reduce the amount of white space on each page, and thus minimizing the size of the document.

6 | Page 3.16-1, section 3.16.3, Consultation with Mexico. Correct the first sentence to, "... Reclamation, through the **United States Section**, International Boundary and Water Commission (**USIBWC**) is in the process ...."

6: This correction has been made.

7 | Page 3.16-2. In the second paragraph, change the first sentence to, "In his transmittal, Commissioner **Herrera** expressed a concern ...."

7: This correction has been made.

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2

8 Page 3.16-2, listed six items of Mexican Commission's concern for the distribution of surplus water among the Lower Diversion States in the United States. On page 3.16-3, the first paragraph states that, "Although Reclamation recognizes the potential for the United States, acting through the Secretary of State, to continue to work with Mexico on a bi-national basis to clarify and resolve Mexico's concerns, it is not clear that these concerns are a result of interim surplus criteria. Issues not arising from interim surplus criteria are outside of the scope of this DEIS."

8: Comment noted.

9 The Mexican Commissioner's letter of May 11, 2000 represents the Mexican Government's perception of impacts in Mexico. The USIBWC assumes that Reclamation's comments are preliminary and subject to further information and clarification from Mexico. The USIBWC has joined the Mexican Section of the International Boundary and Water Commission in a government to government consultation under the terms of IBWC Minute 242, which requires reciprocal consultations on new or significant modifications to surface or ground waters. These consultations have consisted of technical meetings on April 12, 2000 in Henderson, Nevada; May 12, 2000, in Mexico City; and August 31, 2000 in Las Vegas. At these meetings, the proposed interim surplus criteria and alternatives under consideration were explained to Mexico's National Water Commission (CNA) and Secretariat of Environment, Natural Resources and Fisheries by Reclamation. Discussed in detail were computer runs for impact scenarios at the Northerly International Boundary (NIB), using the index sequential method of historic records since 1906, for the alternatives under consideration. Reclamation's conclusion is that there is not significant difference on flows arriving at the NIB under current practice and Mexico arriving under the Six States and California plans.

9: Comment noted and Reclamation concurs with the information presented in this comment. Reclamation has revised the discussion for flows arriving at the NIB in Sections 3.3.4.5.4, 3.4.4.5 and 3.16.5 of the FEIS.

10 Mexico's letter of May 22, 2000 along with a letter by the CNA to Reclamation, expressed its concern that the interim surplus criteria could eliminate surplus water flows to Mexico in the 15 years in which it is in effect and its objection to implementation of the interim surplus criteria unless impacts in Mexico are mitigated. Mexico listed six perceived impacts of interim surplus criteria and the lining of the All American Canal and objected to the implementation of the criteria unless these impacts are mitigated. Mexico expressed concern that these impacts could weaken bilateral natural resource protection efforts and urged consideration of use of surplus flows for environmental purposes.

10: Comment noted.

11 More recently, Mexico provided a letter dated September 6, 2000 (copies of Spanish and English translation attached) in which Mexico observes that while Mexico's guaranteed water delivery of 1.5 million acre feet are guaranteed under all alternatives, the probability of Mexico receiving an additional 200,000 acre feet in scheduled deliveries in years of surpluses, are less than the historical probability of 35 per cent. Further, Mexico observes that the probability of there being excess flows below Morelos Dam in the limitrophe section of the river would be well below the historical average of 38 per cent. Mexico perceives that agricultural use would be impacted but that the major impact would be to the environment from Morelos Dam to the Gulf of California. Mexico repeats its objection to the surplus criteria unless mitigation of impacts in Mexico take place and again urged consideration of the use of surplus flows for environmental purposes.

11: Comment noted.

12 Page 3.16-11, section 3.16.5.2 Comparison of Surplus Alternatives to Baseline Conditions. Change the fourth sentence to, "The largest difference in frequency is observed **at** the end of the interim surplus criteria ...."

13 Page 3.16-13, section 3.16.6 Preliminary Summary of Effects to Special-Status Species and Habitat in Mexico, subsection 3.16.6.1 Potential Effects to Habitat in Mexico. The U.S. Section must assert that the United States has a right to maximize its use of Colorado River waters reserved to it under the 1944 Water treaty and recognizes that Mexico's right is only for 1.5 million acre feet. The U.S. Section also iterates that the United States Government does not assume any obligation to mitigate for adverse impacts in Mexico. At the same time, the U.S. Section observes that the IBWC consultations with Mexico are a forum to receive comments from the Government of Mexico and provide for technical discussion to carry out, in the context of comity, joint cooperation projects in support of the Colorado River riparian ecology to the Gulf of California that would have a benefit to the United States and Mexico.

Thank you for the opportunity to review the DEIS. If you have questions, please call Mr. Douglas Echlin at 915/832-4741.

Sincerely,

Sylvia A. Waggoner
Division Engineer
Environmental Management Division

12: The data in the FEIS has been updated (see Section 3.3.3.4 for a discussion). The description in Section 3.16.5.2 reflects these changes.

13: Comment noted.

09/08/00 15:24 FAX 202 208 5503 REGIONAL LIAISON 002

United States Department of the Interior

SEP 0 8 2000

NATIONAL PARK SERVICE
1849 C Street, N.W.
Washington, D.C. 20240

IN REPLY REFER TO:
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Memorandum

To: Commissioner, Bureau of Reclamation

From: Director

Subject: Comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement

The National Park Service (NPS) appreciates the opportunity to work closely with the Bureau of Reclamation as a Federal Cooperating Agency in the preparation of the subject Draft Environmental Impact Statement. This cooperation facilitated direct and early input into the preparation of this document. As a consequence, we have been successful in resolving many NPS resource issues as well as clearing up any misunderstandings and routine editorial issues. We look forward to continuing to work with Reclamation to complete this document within the timeframe specified by the Secretary. The enclosed comments represent the most important NPS issues related to the description and analysis of impacts to the resources of the three affected park units -- Grand Canyon National Park, Glen Canyon National Recreation Area, and Lake Mead National Recreation Area.

In addition to finalizing the EIS, and because of the important issues surrounding the interim surplus criteria, the NPS would like to participate, to the extent possible, in the development of the Record of Decision for this document.

We appreciate all of your cooperation on this effort. If you have any questions, please feel free to contact me or Michael Soukup, Associate Director for Natural Resource Stewardship and Science at 202-208-3884.

Attachment

cc: NPS Regional Director, Intermountain Region, Denver, CO
NPS Regional Director, Pacific West Region, San Francisco, CA
BOR Regional Director, Upper Colorado River Region, Salt Lake City, UT
BOR Regional Director, Lower Colorado River Region, Boulder City, NV
Superintendent – Grand Canyon NP; Glen Canyon NRA; Lake Mead NRA
Molly Ross, K.C. Becker, Robert Snow – DOI Office of the Solicitor
Assistant Secretary for Fish and Wildlife and Parks
Nancy Hayes – Office of ASFW
Deputy Secretary Hayes

NATIONAL PARK SERVICE
COMMENTS
COLORADO RIVER INTEIM SURPLUS CRITERIA
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

September 8, 2000

The National Park Service (NPS) has appreciated the opportunity to work closely with Bureau of Reclamation (Reclamation) staff in Boulder City, Nevada, as a cooperating agency in the development of the DEIS for assessing the effects of Colorado River Interim Surplus Criteria. This cooperation facilitated direct and early input into the preparation of this document that includes an analysis of the effects of alternative interim surplus criteria on the resources of Grand Canyon National Park, Glen Canyon National Recreation Area, and Lake Mead National Recreation Area. As a consequence, we have been successful in resolving many NPS resource issues. The NPS will continue to work closely with Reclamation to provide this level of input for the FEIS.

The NPS does, however, have certain unresolved issues concerning the analysis of impacts to certain resources potentially affected within the three park units.

1 Scope of the analysis – The DEIS uses different methodologies to assess the various resources. Predicted changes in water levels of both reservoirs are made utilizing the 10th, 50th and 90th percentile of potential hydrological inflows. Annual depletion projections for the three lower basin states are also assessed using these three percentile values. The analysis of cultural resource impacts utilizes 10th percentile water levels to show the most severe drawdown impacts. Equalization assumptions utilize the worst case hydrologic scenarios to protect 602(a) storage within Lake Powell. The DEIS specifically states that the 90th and 10th percentile lines "bracket" where 80 percent of the future water levels would occur (and presumably 80 percent of the impacts). Given this, it is problematic that the above resources are addressed in a comprehensive fashion in the DEIS but that the consequential effects of water level changes on many other affected NPS resources are made using only median water levels. By conducting resource analysis in this fashion, the potential impact of the proposal tends to be minimized and the full range of effects not disclosed. It would seem appropriate to either fully bracket the potential effects (as was done for many other resources) or clearly disclose the rationale for limiting the scope of the analysis.

2 The DEIS states that interim surplus criteria would be implemented for only 15 years, but assesses the effects of the criteria for a 50-year period. After the 15-year period all alternatives revert to baseline conditions (75R), which is one of the alternatives. Why is one alternative continued through the entire 50-year period of analysis when the others are not? The likelihood of the criteria reverting to this baseline is minimal. It would be appropriate for the FEIS to provide some analysis of the effect of continuing with the various alternatives throughout the 50-year period.

1

1: The methodology used for analysis of various resources was dependent upon the amount of information available and the potential effects identified through modeling. These methodologies are described for each resource/issue analyzed in the various sections of Chapter 3 of the EIS. Note that analysis of recreation resources within both the Glen Canyon and Lake Mead National Recreation Areas determined specific probabilities for certain elevations important to shoreline facilities and navigation with the NRAs. The FEIS contains additional discussion and probability analysis for specific reservoir surface elevations identified through discussions with NPS and others during preparation of this document.

2: As noted in this comment, the interim surplus criteria would be in effect for 15 years, after which these criteria would terminate and determination of surplus conditions would revert to the current AOP procedures. However, the model operation for each alternative was extended beyond the interim period, to 2050, with the interim criteria reverting to the baseline criteria, so that any after effects resulting from the alternatives would be indicated. The baseline model operation was also extended to 2050 so that comparisons could be made. The baseline operating strategy in the DEIS was not an alternative, but was established as a "benchmark" against which to compare the effects of the alternatives, as discussed in Section 2.2.5. This continues to be the case for the modeling analyses in this FEIS.

COMMENT LETTER

RESPONSES

3 Recreation – The DEIS addresses the effects of water level changes on recreation facilities (marinas) in Lake Powell and Lake Mead caused by interim surplus criteria by quantifying the costs associated with facility adjustment and capitol acquisition both incrementally and over the 15-year period. The FEIS should quantify the total cost for the entire 15-year period for the 10, 50, and 90 percent hydrologic inflow projections. The DEIS suggests that one or more marina sites could become inoperable at certain unspecified water levels. However, no analysis of these critical levels is provided. Such analyses could easily be made using existing GIS and other data.

4 The effects of marina closures could have broad economic consequences to the local and regional economy that should be recognized and summarized in the FEIS. Further, the effect of such closures on the ability of our concessionaire to make a profit should be analyzed; especially the ability of the Navajo Nation to open and operate their new facility at Antelope Point on Lake Powell should be discussed.

5 River flows below Glen Canyon Dam – The DEIS does not assess the effects of interim surplus criteria on operational river flows below Glen Canyon Dam within Grand Canyon and Glen Canyon. The DEIS states that any effects would be handled through the Glen Canyon Dam Adaptive Management Program (AMP). While the discussion to handle effects through the AMP is reasonable, the potential consequences of the criteria should be clearly specified as they are for flows below Hoover Dam. Further, the potential consequences to resources caused by

6 any change in flows through the Grand Canyon should be specified especially for threatened and endangered and other special status species.

7 Beach Habitat Building Flows (BHBFs) – BHBFs are an important management tool affecting the natural and cultural resources in Glen Canyon and Grand Canyon. While the DEIS section on BHBFs shows a minor impact due to implementation of the interim surplus criteria, clarity would be enhanced by a more compete display of the frequency analysis. We suggest that a continuous curve of the frequency of occurrence of BHBFs supplement Table 3.6- 1, and that some additional description be added on how the likelihood of BHBFs changes with specific reservoir elevations as a result of the surplus alternatives.

8 Additional research is required to better understand and optimize the effects that BHBFs have on the environmental resources downstream of Glen Canyon Dam. The NPS recommends that the Record of Decision for this EIS direct the Glen Canyon Dam Adaptive Management Program to consider and address a program of several test flows to research alternative BHBF designs. The NPS suggests that these research tests may be implemented independent of the hydrologic triggering criteria required to conduct BHBFs for Adaptive Management purposes, while maintaining the integrity of the hydrologic criteria for long-term implementation of BHBFs.

9 Threatened and endangered (T&E) fish species – T&E fish species are described for the Colorado River and San Juan River inflow areas of Lake Powell. Specifically, the DEIS acknowledges that critical habitat has been designated for the razorback sucker, Colorado pikeminnow, and bonytail chub. However, the effects of Lake Powell water levels and interim surplus criteria were not included within the environmental consequences section of the DEIS. If there are potential impacts on these species, they should be described in the FEIS. The NPS recommends that any effects be managed through the previously established recovery implementation programs for the Colorado and the San Juan rivers.

2

3: It is recognized that different percentiles could be used for presenting the information in Section3.9.6. However, Reclamation believes that using median elevations, while not showing all circumstances, appropriately presents the differences between the alternatives and baseline conditions.

4: Differences between baseline conditions and alternatives at the 3626 ft. level are typically less than five percent. Subsequent to publishing the DEIS, Reclamation received additional information regarding threshold elevations from NPS and the Navajo Nation. The FEIS discusses this information in Section 3.9.2.2.2.1, and presents analyses for threshold elevations of 3626 feet and 3677 feet msl.

5: As discussed in the EIS in Sections 1.4.2 (Glen Canyon Dam Operations) and 3.2.2 (Adaptive Management Program Influence on Glen Canyon Dam Releases), the Adaptive Management Program would continue to address resources within the river corridor below Glen Canyon Dam. Two types of flows are of particular concern to the Adaptive Management Program: BHBFs and low steady summer flows. Sections 3.6.2 and 3.6.3 analyze the potential effects of interim surplus criteria on the frequencies of these two flow regimes. No additional analysis of the potential effects on resources within this segment of the river corridor is necessary because, as discussed, the Adaptive Management Program would continue to address these resources consistent with the Operation of Glen Canyon Dam ROD. Because flows below Hoover Dam are associated with water deliveries based on depletion schedules provided by the Lower Division states, modeling conducted for the EIS (which includes depletion schedules) produces forecasts of specific monthly flow volumes. In contrast, releases from Glen Canyon Dam are not made to meet water delivery schedules and are, instead, subject to the requirements of the Operation of Glen Canyon Dam ROD and the Adaptive Management Program. As such, it is not possible to provide the same level of modeling projections for Glen Canyon Dam releases.

6: Information regarding potential effects on river flows and special status species below Glen Canyon Dam, within Grand Canyon and Glen Canyon, is in Section 3.8 of the FEIS.

7: A continous plot of the probability of BHBFs has been added to Section 3.6.2.

8: The Department of the Interior agrees with this comment and the concept that it is important to conduct additional research to better understand and optimize the effects of BHBFs. The Glen Canyon Dam Adaptive Managment Program (AMP) was established as a Federal Advisory Committee to assist the Secretary of the Interior in implementing the Grand Canyon Protection Act of ctobger 30, 1992, which is embodied in Public Law 102-575. The Grand Canyon Protection Act directs the Secretary, among others, to operate Glen Canyon Dam in accordance with the additional criteria and operating plans specified in section 1804 of the Act and to exercise other authorities under existing law in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to the natural and cultural resources and visitor use. Section VI of the October 8, 1996 Record of Decision on the Operations of Glen Canyon Dam Final EIS commits the Department to the implementation of BHBFs, the scheduling, duration, and flow magnitude of which will be recommended by the Adaptive Managment Work Group and scheduled through the Annual Operating Plan process. Reclamation agrees that the AMP is the proper forum in which to explore experimental fows so that in the future, when hydrologic conditions allow such BHBFs as management actions, they can be performed for the greatest benefit of the resources. In advance of the Record of Decision, the Department can report that efforts to expedite consideration and development of the parameters and criteria for future test flows, including BHBFs, are underway through a recently formed subgroup of the AMP's Technical Work Group. Reclamation intends to continue to pursue BHBFs through the AMP. We welcome the continued participation and input of the National Park Service in this effort.

9: Revisions have been made to Section 3.8.2.2.3. Note that potential effects to special-status fish species were analyzed with respect to operations at both Glen Canyon Dam and Hoover Dam. The section also notes that previously established recovery programs are to remain in place. No specific threshold elevations at Lake Powell pertaining to special-status fish species are known to have been developed. Revisions to the description of designated critical habitat were also made within the section.

10 Cultural resources – The DEIS states that the proposed action is an undertaking but has no potential to affect cultural resources since any within the area of potential affect have been already severely affected by ongoing operations. The DEIS then suggests that certain resources might retain qualities making them eligible for inclusion on the National Register of Historic Places (NRHP) and potentially affected by the action. In fact, this is the case for Lake Powell where three cultural sites (Rock Creek, Dan Canyon burial, and Good Hope Bay) have been discovered since 1983 that are above 3,670 feet msl that have either been excavated or were found eligible for listing on the NRHP. In each case, the sites were originally buried and were then exposed due to the inundation and retreat of lake water. It is highly likely that additional sites such as these would be found once a comprehensive or stratified survey was completed.

11 Certain cultural resources not discussed in the DEIS but likely still in existence and potentially greatly affected by future operations are the buried and surface cultural resources located between the normal and the maximum water surface elevations of the respective reservoirs. Within this elevation band, inundation has occurred only minimally (only twice at Lake Powell and only to the 3,708 feet msl elevation). For example, on Lake Powell, the Crumbling Kiva site is found at elevation 3,710 feet msl. Continuing reservoir operations described within the DEIS could potentially affect this site and any others within this elevation band on either of the reservoirs. Without an adequate survey, it is impossible to determine the extent of the impact.

12 Given this rationale, it would be appropriate for the NPS and Reclamation to determine a suitable course of action to identify and protect any remaining cultural resources that may be affected by the proposed action and continuing operations.

13 Lake water quality – The water quality of Lake Mead is generally described in the DEIS. Lake levels and overall volume (through the various alternatives) are recognized as a critical factor in predicting overall water quality. Specifically, the DEIS states that "contaminant dilution and lake water quality are directly proportional to lake volume" and that a reduction in volume would "likely have deleterious effect on lake water quality and, potentially, on water quality withdrawn by SNWA." A general summary of the chemical and pollutant characteristics of the lake is provided but no specific projections are given on how these values would change with the various surplus alternatives. Changes to water quality are implied through very broad summaries of elevation, volume, and surface area changes over the 50-year analysis period (Table 3.5-6). This summary tends to minimize the potential effects by first utilizing median inflow projections and then averaging the change in water level between three analysis periods. Given that the limnology and water quality of Lake Mead are generally known, predictions about changes could be developed and appropriately included in the FEIS.

14 In addition, water withdrawals from Lake Mead would approach 60 feet from surface elevation even utilizing the median inflow projections. This potential is even greater if the 10th percentile inflow projects are utilized. In both cases water release temperatures could increase and potentially affect the aquatic ecology downstream. A discussion of these potential impacts should be included in the FEIS.

3

10: Reclamation's understanding was that most, if not all, historic properties located within the area of fluctuations of the reservoir had lost sufficient integrity that they would no longer be capable of conveying their historic significance. This comment provides important information that this is not the case for all historic properties.

11: Reclamation agrees that the inventory and identification of cultural resources that was conducted prior to the completion of the reservoirs is inadequate by today's historic preservation standards. However, prior to completing the reservoirs, the National Park Service was in compliance with the Historic Sites Act of 1935; they did complete the surveys, investigations and researches of historic and archaeological sites, buildings, and objects for the purpose of determining which possessed exceptional value for commemorating or illustrating the history of the U.S. Furthermore, the NPS did comply with the Reservoir Salvage Act of 1960 with respect to Lake Powell. Archeological data affected by construction of Glen Canyon Dam were preserved to the standards of the time. Reclamation continues to ensure that these data are preserved and accessible to the public based on the Historic Sites Act and Reservoir Salvage Act.

12: For purposes of the undertaking defined as the adoption of specific interim surplus criteria and the subject of this EIS, the projected or predicated effects appear to be encompassed within normal operations. Normal or on-going operations are not the subject of this EIS, therefore, any effects or the resolution of effects of existing operations are beyond the scope of this EIS. Reclamation is, of course, eager to comply with the National Historic Preservation Act and its implementing regulations. Reclamation agrees with the NPS that it has Section 110 responsibilities with respect to on-going operations.

13: The water quality analysis in the EIS appropriately identifies the potential effects of the interim surplus criteria. Potential effects are discussed in terms of the general effects of changing reservoir elevations because specific elevations and periods that such elevations would occur are unknown and cannot be predicted. Use of the median elevations projected by system modeling to discuss differences between the alternatives and baseline conditions does not minimize these potential effects, and instead presents a reasonable means of comparison of potential future outcomes.

14: Potential effects on sport fisheries of increased temperature of water releases from Hoover Dam have been included in Section 3.7.3 of the FEIS.

SEP-07-2000 12:19 POWER SCHEDULING WAPA P.02/02

Department of Energy
Western Area Power Administration
Desert Southwest Customer Service Region
P.O. Box 6457
Phoenix, AZ 85005-6457

SEP - 7 2000

Ms. Jayne Harkins
Attention: BCOO-4600
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

1 Western Area Power Administration (Desert Southwest Region) supports the effort by the Bureau of Reclamation to prepare a Draft Environmental Impact Statement for the Colorado River Interim Surplus Criteria. However, long-term projections prepared by the Bureau of Reclamation show a significant probability that the elevation of Lake Mead will trend to a much lower level. Using existing power production facilities at Hoover Dam, Federal electric power capacity (megawatts, MW) and energy (megawatt-hours, MWH) will fall as the elevation of Lake Mead is lowered. Generation may be curtailed if Lake Mead approaches the Minimum Power Pool elevation. Thus, less low cost Federal power will be available for delivery to electric power consumers in Arizona, California and Nevada.

2 In addition, Western notes that on July 12, 2000, the Bureau of Reclamation reduced the Hoover Powerplant rated capacity from 2074 MW to 2062 MW due to the lowering of Lake Mead elevation to 1203-feet. Thus, actual output capability is less than indicated in Table 6: "Hoover Dam Elevation and Output" in Appendix N: "Energy Analysis Worksheets". In this projection model table, a reduced capability of 2062 MW is not expected until an elevation of 1172-feet, not 1203-feet.

3 From the public power perspective, Western believes that it is in the public interest to maintain Lake Mead at an elevation range similar to its recent historical average. Western supports giving special consideration to essential water needs and a lower lake elevation during severe drought conditions.

Sincerely,

Anthony H. Montoya
Assistant Regional Manager
for Power Marketing

TOTAL P.02

1: Comment noted. As the EIS discusses, the amounts of power available from Glen Canyon and Hoover Dams will be reduced when lake levels decline.

2: The capacity of 2074 MW is produced from the application of theoretical turbine curves to year-end reservoir elevations. There will always be a difference between theoretical curves and actual operating results. Since the difference is approximately 0.5 percent, this error is believed to be within the error of the forecast.

3: Comment noted.

Department of Energy
Western Area Power Administration
P.O. Box 11606
Salt Lake City, UT 84147-0606

SEP 12 2000

Ms. Jayne Harkins
ATTN: BC))-4600
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Ms. Harkins:

Western Area Power Administration (Western) supports the Bureau of Reclamation in its efforts to describe the impacts of various Colorado River Interim Surplus Criteria Proposals in a draft environmental impact statement.

Our Desert Southwest Regional Office will provide you with comments related to Hoover Dam and Lake Mead. This, the CRSP MC, will comment on details in your EIS that deal with Glen Canyon Dam and Lake Powell.

Comments:

1 1. Figure 3.3-5 illustrates that the elevation of Lake Powell declines over the 50-year time frame of the analysis in the baseline case. It is difficult to understand why this happens and the text of the EIS provides very little explanation. This should be clarified. If it is a result of increased Upper Basin depletions, the EIS should describe how this, under existing reservoir management practices, would affect lake levels downstream.

2 2. The description of existing conditions related to hydropower production from Glen Canyon Dam is woefully inadequate. While the Glen Canyon Powerplant is part of the CRSP power system and in turn part of the WSCC power "grid," the electrical power from Glen Canyon Dam is sold to specific electrical power customers. For the most part, these customers serve rural areas and small towns and are a very small part of the total WSCC system of generators, consumers, and transmission lines. Actions at Glen Canyon Dam have affects on these customers that the WSCC system would scarcely take note of. Therefore, the existing conditions for hydropower ought to be a description of those long-term firm customers who buy power from the CRSP and their retail customers. Further, the impacts of the various alternatives ought to be described in terms of the impacts to those who ultimately bare them: CRSP firm power customers and their member systems and retail loads.

1: Figure 3.3-5 of the DEIS presents the range of Lake Powell water surface elevations modeled under baseline conditions (90th, 50th and 10th percentile values). This same figure also shows the results for four of the 85 hydrologic traces modeled under the baseline conditions. The four traces provide a representation of the fluctuation that occurs under the various assumed hydrologic sequences. As can be seen from these four traces, the water surface elevations of Lake Powell fluctuate from full to lowered conditions throughout the 50-year modeled period. However, as time progresses, due to increasing Upper Basin depletions, Lake Powell's median and 10th percentile elveations decline.

2: Please see response to Comment 16-2. Reclamation believes that the level of analysis for energy resources presented in the EIS appropriately identifies the potential effects of interim surplus criteria.

2

We appreciate the opportunity to comment. Please telephone me at (801) 524-3522 if you have questions or need clarification on these comments.

Sincerely

C. Clayton Palmer

Clayton Palmer
Team Lead, Environmental Planning and
Resource Analysis

From: "John Counsil" <Counsil@wapa.gov>
To: ibr3dm10.3LCDATE(JHARKINS)
Date: 8/24/00 8:38AM
Subject: Minor Comment: Attachment N, Interim Surplus Criteria DraftEIS

Jayne,

Please check Table 2 and Table 4 in Attachment N (Energy Analysis Worksheets).

1 I am not sure if this recommendation is correct, but it appears the change needs to be:

Either change units from "(GWh)" to "(average GWh/month)"

or

Multiply each value in tables by 12 to obtain GWh.

CC: "CLAYTON PALMER" <CSPALMER@wapa.gov>

1: The titles to the Tables 2 and 4 were changed to "Average Monthly Energy Production At Lake Mead (GWh)" and "Average Monthly Energy Production at Lake Powell (GWh)," respectively.

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MEXICAN AGENCIES/ORGANIZATIONS

AUTONOMOUS UNIVERSITY OF BAJA CALIFORNIA

Rectory
Doc. No. 018/2000-2

Ms. Jayne Harkins
Regional Office
Bureau of Reclamation
Boulder City, Nevada 89006-1470

Dear Madame:

The undersigned, Victor Everardo Beltran Corona, Rector of the Autonomous University of Baja California, addresses you in the most respectful manner to advise you that we have received information generated by the Bureau of Reclamation of the United States in a document entitled: "Interim Criteria for the Management of Excess Flows in the Channel of the Colorado River," in which the redistribution of the volumes of excess flows in the Lower Colorado River Basin for the next 15 years is being considered.

Given the enormous importance that the said waters represent to the State of Baja California in Mexico, we are addressing you for the purposes of providing you, for your consideration, with our comments regarding the plan proposed by the Bureau of Reclamation and its probable impacts on the ecosystem and in general on our entire region.

1 cont'd below

The Colorado River hydrologic basin is a region which comprises a territory of nature which should be analyzed as an integrated ecosystem from its origin in the Rocky Mountains of the United States to its final part in the Gulf of California in Mexican territory.

supports 1

From the beginnings of the XX century our region was known as a region of abundant vegetation and native fauna which developed in harmony and symbiosis due to the waters of the Colorado River which naturally watered these lands. Hydrologic records of the Bureau itself establish the enormous flows which the Colorado River provided to the delta region. The records report average values which exceed 20,000 million cubic meters per year, situation which drastically changed when the United States government initiated the construction of Hoover Dam in Black Canyon, state of Nevada, causing enormous ecological damage to the entire region.

Additionally, the adverse impacts increased year after year. The reduced water flow volume permitted to pass to the Mexican side was aggravated even further with the dispositions agreed to by the representatives of the two governments, United States and Mexico, who signed the International Water Treaty on February 3, 1944, which regulates the deliveries of water to our country. Nevertheless, the adverse conditions under which this document was negotiated have presented to Mexico a difficult situation in the administration and assignment of water resources. In 1944, they only considered assigning water rights for a reduced part of the agricultural lands and small settlements, overlooking that over time water needs would increase considerably.

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September 8, 2000
No. Ms 083

Page 1 of 3
File: WAC 10 Surplus Water Supply - Colorado River

1: The Interim Surplus Criteria EIS addresses potential effects of the implementation of interim surplus criteria, not the effects of management of the Colorado River as a whole. As such, the impact analysis focuses on areas that may be affected by interim surplus criteria. Note that Section 3.16 of the EIS discusses the potential for decreased excess flows to Mexico as a result of interim surplus criteria and identifies the potential effects to the natural and physical environment within Mexico may be developed.

supports 1

1 cont'd

This grave omission not only delayed the future growth of regional agriculture and of the cities in our state, but also overlooked a fundamental aspect of the development of all of us who live in this region, the sustainability of the Colorado River Delta, which comprises all the southern part of the Colorado River and the Upper Gulf of California. We emphatically point out that the physical boundary established by man cannot transcend the boundaries established by nature, the Delta also forms part of the hydrological basin of the Colorado River.

During many years (1961-1977), there were many problems between the governments of the United States and Mexico regarding the quality of the waters arriving in the region. Currently, some of these problems still persist; nevertheless, in the hopes of achieving good neighborship between the two countries, our farmers are accepting waters of low chemical, physical and bacteriological quality, such as the case of the waters delivered at the point of diversion known as the Southerly International Boundary at San Luis Rio Colorado, Sonora, which as part of the International Treaty each year receives wastewater coming from the urban and agricultural drainage system of the Yuma, Arizona area, to be used in the agriculture of the San Luis Valley with the consequent deterioration of the subterranean aquifer.

supports 1

Currently, a great number of deep wells in the area have had to be relocated due to the grave deterioration of the water quality which has lessened harvests, and as a consequence harmed economic conditions.

The decrease in the quality of the water delivered at the Northerly International Boundary during the winter is another problem facing our farmers, and one which in addition to the deficiencies in the natural drainage of our soils, makes for even further crop yield reductions.

Based on hydrologic studies conducted by our researchers, it has been possible to determine that the cycle of Colorado River flows periodically reports the presence of extraordinary volumes in the natural channel. This has been analyzed using, as an indicator of the environmental impact, the species of shrimp which develops in the Upper Gulf of California, which has been the recipient of the beneficial impact of the fresh waters which are registered during periods of "El Niño" which stimulate the development of marine fauna, especially shrimp species Atotoaba and the *vaquita marina* (a porpoise); in addition to favoring an oceanographic condition of residual currents in the Upper Gulf of California, which due to mass compensation, results highly beneficial to fishing for diverse species and an excellent level of economic development for the fishing community.

Today, the impressive system of dams on the Colorado River has permitted the establishment of an almost absolute control of its waters on their way south. After the construction of the last of the large dams in the channel of the river (Glen Canyon Dam), the possibilities of receiving fresh water in the Mexican area of the Delta were reduced; nevertheless, after May 1, 1979 we were heartened to see that fresh water was arriving in our region, which in spite of flooding in low areas, represented a resurgence in the natural conditions for our flora and fauna. The excess flows continued for the following 20 years: 1980-1981; 1983-1988; 1992-2000.

supports 2

It should be mentioned that during those years in which we have not had the additional volumes contemplated in the International Treaty for the Colorado River, there have been environmental effects on the environment, principally on marine species, such as shrimp, totoaba and *curvina*. This last species, in the last 25 years, had not achieved the level of development that it now has, and this thanks to the maintenance of additional fresh water flows in the natural channel of the Colorado River.

The Mexican delta of the Colorado River comprises a little over 300,000 hectares, of which nearly 35,000 hectares naturally receive the benefit of the waters flowing in the channel. The riverside vegetation, currently constituted of willows, poplars, mesquites, salty pine, *cachanilla*, and others, form a rich, virgin area inhabited by a multitude of animal species, many of which are migratory birds coming from Canada and the northern United States to establish their reproductive areas for future generations.

2

The Autonomous University of Baja California comes before you in the most respectful manner seeking that the proposal that additional volumes of fresh water continue flowing in the Colorado River to the delta region of the river be considered, since only in this manner will it be possible to sustain viable one of the most notable and important ecosystems in the world.

The characteristics which the ecosystem of the Colorado River Delta presents are unique, since only in this region do terrestrial and marine species reproduce as in no other part of our planet; as such, this region should be considered by all of us as a legacy for humanity currently constituted as a Biosphere Reserve.

At this time you are about to make a decision which could provide the hope for the life and development of one of the most important ecosystems which nature has provided to all of us who live in they hydrologic basin of the Colorado River.

SINCERELY,
Mexicali, B.C., September 6, 2000
"FOR THE COMPLETE ACTUALIZATION OF MANKIND"
RECTOR
(Signed)
VICTOR EVERARDO BELTRAN CORONA

Translation: RAV:rav
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September 8, 2000
No.: Ma. 083

Page 3 of 3
File: WAC 10 Surplus Water Supply - Colorado River

2: The U.S. through the IBWC has entered into formal consultations with the Government of Mexico regarding this action. In the context of comity, joint cooperation projects in a support of the Colorado River riparian ecology to the Gulf of California that would have a benefit to the United States and Mexico.

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
MEXICAN SECTION

(SEAL Secretariat of Foreign Relations)

TRANSLATION
NO.: LAE 01644/00
FILE: LAE/33
Ciudad Juárez, Chih.
September 6, 2000

Eng. Carlos Marin
Principal Engineer
International Boundary and Water Commission
The Commons Building C, Suite 310
4171 North Mesa
El Paso, Texas 79902-1422

Dear Eng. Marin:

I refer to the Interim Criteria for the declaration of excess flows in the channel of the Colorado River, as well as to the binational technical meeting last August 31st at Las Vegas, Nevada in which we reviewed the information provided to the Mexican Section concerning the results obtained from the models for the alternatives considered in the said criteria.

In this regard, I have the pleasure of forwarding to you the comments of the National Water Commission regarding the negative impacts which the implementation of the said criteria would provoke in the area of influence in our country in the next 15 years.

1 As the Mexican delegation advised during the referenced meeting, regardless of the fact that all the alternatives guarantee the delivery of 1.5 million acre-feet in 100% of the years, the probability of the delivery to Mexico of the additional 200,000 acre-feet volume is less in all the alternatives (30-34%), compared to the historical probability of 35%. Also, the probability that there will be excesses in the Colorado River downstream of Morelos Dam on average is 18%, well below the historical average (38%). The above, considering annual flows greater than or equal to the 1,000 million cubic meters (810,714 acre-feet) per year, equivalent to an average annual flow of 30 cms (1,059 cfs).

2 The above data obtained from the simulation are higher than those which would be obtained with the models for the actual conditions (September 1, 2000).

3 Based on the above, if it is true that the agricultural users would have only a slight impact in the next 15 years (using the higher table), the greater adverse impact would be felt in the environmental conditions downstream of Morelos Dam to the Sea of Cortez.

4 It is a fact that the values in the simulation are lesser than those recorded, nevertheless, considering the last 20 years during which the two major dams were already in operation, the percentages for excess flows downstream of Morelos Dam are much greater (50%), so that the comparison should be made using these data given that they are the result of the actual system of dams on the Colorado River.

5 cont'd below The alternative which presents the highest values for frequencies and results less damaging to Mexico is the

Dist.: Orig. - C&R; Control Copy - FAO; [e-mail: PE Marin; WAD Rakestraw; DD Robinson; EMD Waggoner; FAO Ybarra]
Translation : JGS:jgs — September 8, 2000 — Page 1 of 2
I:\Letters\Fromex00\Mx24100.wpd — No.: MX 241 — File: WAC 10 Surplus Water Supply - Colorado River

1: See response to Comment 11-13 regarding additional deliveries to Mexico.

2: It is unclear what this comment means by "actual conditions." Reclamation used data and models accepted as the most representative currently available.

3: The delivery of water to Mexico under all modeled condtions in this FEIS was consistent with the requirements of the Treaty. The diversion and use of such Treaty water is solely at Mexico's discretion. The delivery of excess flows to Mexico occur when flows available in the Colorado River exceeds the amount needed to meet the beneficial water needs of Lower Basin users in the United States. It is not within Reclamation's discretionary authority to make unilateral adjustments to water deliveries to the international border.

4: See response to Comment 31-8 for a discussion of the Index Sequential Method of modeling. A direct comparison with historical values is not representative, since current and projected depletions are greater than those in the past.

5: Comment noted. See response to Comment 57-158 for a discussion of the change in excess flows to Mexico.

WARNING: This is a **"Sensitive but Unclassified"** Commission document which is available only for official use and must **NOT** be released outside the U. S. Section without prior approval from the U. S. Secretary.

5 cont'd "Six State" one, with which we find: 100% lower table, 33% higher table and 18% excess flows downstream of Morelos Dam with flows greater than 1,000 million cubic meters (810,714 acre-feet) per year, equal to an average annual flow of 30 cms (1,059 cfs).

6 Based on the above, I reiterate Mexico's concern given the perspective of decreased excess flows downstream of Morelos Dam due to the fact that part of these is used to leach agricultural lands which prevents the increase in the salinity of 200,000 hectares of cultivation in the Mexicali Valley. Also, there would be very heavy negative effects on the Mexican aquifer with the quantity and quality impacts on the under river channel recharge.

7 Finally, let me reiterate to you that the Government of Mexico is not in agreement in that the proposed plan be put into practice without considering the measures that would be implemented to mitigate its impact in Mexican territory, as well as the request that the environment be considered as a user of the excess flows that are declared in the Lower Colorado River Basin.

I take this opportunity to reiterate to you the assurances of my most distinguished consideration.

Sincerely,
(Signed)
Gilberto Elizalde Hernández
Principal Engineer

Distr: Orig. - C&R; Control Copy - FAX; [illegible]-mail: PE Marin; WAD Rakestraw; DD Robinson; EMD Waggoner; FAO Ybarra
Translation - JGS:jgs | September 8, 2000 | Page 2 of 2
I:\Letters\Fromwd00\Mx24100.wpd | No.: MX 241 | File: WAC 10 Surplus Water Supply - Colorado River

6: See response to Comment 56-16.

7: See response to Comment 56-16. Also, the U.S. Section iterates that the United States Government does not assume any obligation to mitigate for adverse impacts in Mexico. At the same time, the U.S. Section observes that the IBWC consultations with Mexico are a forum to receive comments from the Government of Mexico and provide for technical discussion to carry out, in the context of comity, joint cooperation projects in support of the Colorado River riparian ecology to the Gulf of California that would have a benefit to the US and Mexico. Reclamation is working with the IBWC through the consultation process to identify joint cooperation projects. Mechanisms that the Department of the Interior, and particularly the Bureau of Reclamation, have been working on include the Joint Declaration and the follow-up conference held October 11, 2000, in Washington, D.C. Regarding the Colorado River delta area, Reclamation is also actively participating in the Fourth Technical Work Group (Delta Task Force). It is a bi-national group working to conduct a joint baseline study of the water and natural resource conditions in the Cienega de Santa Clara and the adjoining lowermost part of the delta of the Colorado River which utilizes the resources of participating agencies in monitoring, field work, photography and data exchange.

LOGO - MEXICALI BUSINESS COORDINATING COUNCIL

September 4, 2000
Mexicali, Baja California

Jayne Harkins
Bureau of Reclamation
Boulder City, Nevada

It has come to the attention of this business organization that the USBR has presented a proposal or criteria for the management of the excess flows in the Lower Colorado River Basin for the next 15 years for the purposes of distributing them among the users in the lower basin and support the state of California in its assignment of Colorado River waters.

1 This means that in the next 15 years, Mexico will cease receiving the excess flows that in the last 50 years averaged on the order of 2,500 million cubic meters annually (2 million acre-feet), limiting us to the 1,850 million cubic meters (1.5 million acre-feet) established in the treaty.

Additionally to this, you have projected, as a water conservation measure, the lining of the All-American Canal, which when implemented would reduce the flow of groundwater toward Mexico.

2 cont'd below If these programs are implemented, Mexican territory would be negatively impacted resulting in the following:

- The availability of water in the Mexicali Valley would be reduced, as the dynamic levels in the deep wells would be lowered this causing an increase in the costs of pumping the groundwater.
- With the elimination of the surface flows, the aquifer would no longer be recharged provoking an increase in the salinity levels in the same.
- Under normal conditions, there is an increase in the salt content in the agricultural soils of the Mexicali Valley which is reduced using the excess flows to leach these lands, if there are no more excess flows, these lands are condemned to conversion into saline soils.
- All the water received at Morelos Dam will also see an increase in salinity and this would be delivered to the irrigation district with the cancellation of the flows in the channel of the Colorado River downstream of Morelos; this means that there will no longer be flows into the Colorado River Delta in such a manner that the flora and wildlife which has established itself along the Colorado River in Mexico will be extinguished if there is no water.
- At the mouth of the Colorado River in the Upper Gulf of California there exist endangered

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1: See response to Comment 66-1.

2: See response to Comment 66-16.

2 cont'd

species, such as the *vaquita marina* (a species of porpoise) and the totoaba; independent of the efforts that the Mexican government is making to preclude their extinction, without any inflows of fresh water into the Sea of Cortez, the process of species extinction will accelerate.

- The harvest of shrimp and curvina in the area of the upper gulf will be reduced if there are no fresh water flows, thus provoking a negative impact on the fishing activities in the region.

3

We want to express our total disagreement with any measure which will affect the availability of water and its effects on the environment in our country, so we are requesting that you contemplate the possibility of including Mexico in the measures decided for the management of the excess flows in the Colorado River.

We appreciate beforehand your attention to this request and take this opportunity to send you cordial greetings.

Sincerely,
(Signed)
Eng. Aurelio Flores Peña
President

3: Comment noted. See response to Comment 64-7.

LOGO - MEXICALI ECONOMIC DEVELOPMENT COUNCIL

September 4, 2000
Mexicali, Baja California

Jayne Harkins
Bureau of Reclamation
Boulder City, Nevada

It has come to the attention of this community organization that the USBR has presented a proposal or criteria for the management of the excess flows in the Lower Colorado River Basin for the next 15 years for the purposes of distributing them among the users in the lower basin and support the state of California in its assignment of Colorado River waters.

1 This means that in the next 15 years, Mexico will cease receiving the excess flows that in the last 50 years averaged on the order of 2,500 million cubic meters annually (2 million acre-feet), limiting us to the 1,850 million cubic meters (1.5 million acre-feet) established in the treaty.

Additionally to this, you have projected, as a water conservation measure, the lining of the All-American Canal, which when implemented would reduce the flow of groundwater toward Mexico.

2 cont'd below If these programs are implemented, Mexican territory would be negatively impacted resulting in the following:

- The availability of water in the Mexicali Valley would be reduced, also, the dynamic levels in the deep wells would be lowered thus causing an increase in the costs of pumping the groundwater.
- With the elimination of the surface flows, the aquifer would no longer be recharged provoking an increase in the salinity levels in the same.
- Under normal conditions, there is an increase in the salt content in the agricultural soils of the Mexicali Valley which is reduced using the excess flows to leach these lands; if there are no more excess flows, these lands are condemned to conversion into saline soils.
- All the water received at Morelos Dam will also see an increase in salinity and this would be delivered to the irrigation district with the cancellation of the flows in the channel of the Colorado River downstream of Morelos; this means that there will no longer be flows into the Colorado River Delta in such a manner that the flora and wildlife which has established itself along the Colorado River in Mexico will be extinguished if there is no water.
- At the mouth of the Colorado River in the Upper Gulf of California there exist endangered species, such as the *vaquita marina* (a species of porpoise) and the totoaba; independent of the efforts that the Mexican government is making to preclude their extinction, without any inflows of fresh water into the Sea of Cortez, the process of species extinction will accelerate.

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September 6, 2000
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1: As shown in Figure 3.16-1 in the DEIS, the probability of excess flows to Mexico for all years (2000-2050) is not zero (17 percent or greater for all surplus alternatives and baseline.) For the FEIS, the probabilities are 13 percent or greater from 2003 through 2050.

2: See response to Comment 56-16.

2 cont'd

- The harvest of shrimp and curvina in the area of the upper gulf will be reduced if there are no fresh water flows, thus provoking a negative impact on the fishing activities in the region.

3

We want to express our total disagreement with any measure which will affect the availability of water and its effects on the environment in our country, so we are requesting that you contemplate the possibility of including Mexico in the measures decided for the management of the excess flows in the Colorado River.

We appreciate beforehand your attention to this request and take this opportunity to send you cordial greetings.

Sincerely,
Mexicali Economic Development Council
(Signed)
Lic. Federico Diaz Gallego
President

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September 6, 2000
No.: Ms 082

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3: See response to Comment 56-16.

AUG-22-2000 TUE 01:01 PM IBWC EL PASO FAX NO. 915 832 4191 P. 02/03

General Subdirectorate for Construction
Border Affairs Coordinator
Letter No. H00.03.04-191/00

(SEAL)
National Water Commission

Mexico City, Mexico, August 18, 2000

Mrs. Jayne Harkins
Bureau of Reclamation
BC00-46-00, PO BOX 61470
BOULDER CITY, NV 98006-1470
United States of America

(Dear Mrs. Harkins:)

I refer to the draft environmental impact (statement) that identifies the potential environmental effects that would occur if the a specific criterion is adopted for the management of excess flows of water in the lower basin of the Colorado River in the next 15 years.

We understand that the above document will be submitted for public consultation the last two weeks of this month. According to this, as Colorado River water users, we take the liberty of expressing our position on the potential impacts in Mexico if the surplus management criteria proposed by the USBR is applied.

It should be mentioned that this position has already been communicated at the beginning of last June by the Mexican Commissioner to his United States counterpart.

In the current operating conditions, Mexico since 1950 has received an approximate annual volume of 2,530 million cubic meters (2,050 acre-feet) of excess flows which have been used beneficially in our country, precluding the environmental deterioration of the physical and natural environment of the Colorado River.

The plan proposed for the distribution of the excess flows between the three U.S. states of the lower basin tends to eliminate these flows for 15 years. Also, in the California Plan, water conservation measures which would affect the recharge of the groundwaters shared by both countries are being considered; this is the specific case with the lining of the All American Canal. We estimate that the feeding *[sic]* of these flows would have the following effects on the Mexican physical and natural environment:

1 | 1. Impact on the recharge of the aquifer in quantity and quality reducing the beneficial use of the same.

2 | 2. Increase in the salinity of the 200,000 hectares of cultivation in the Mexicali Valley since part of the excess flows are used to leach this soil.

3 | 3. Deterioration in the quality of the water received by Mexico at the Southerly International Boundary (SIB), especially with regard to salinity because the fresh water flows are used to reduce the high salt concentrations at SIB.

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1: Section 3.16.5.3 has been added to the FEIS to provide additional information on the general potential impacts that the implementation of the interim surplus criteria may have on the frequency of excess flows to Mexico as well as the potential resultant impacts to groundwater recharge and salinity south of the international border. See also responses to Comments 64-7 and 56-16.

2: See response to Comment 67-1.

3: See response to Comment 67-1.

AUG-22-2000 TUE 01:01 PM IBWC EL PASO FAX NO. 915 832 4191 P. 03/03

4. Deterioration in the quality of the water received by Mexico at NIB with the reduction of the flows to the amount of the Mexican demand and maintaining discharges to the river of flows from the agricultural drains in the Yuma, AZ area.

5. In the upper part of the Sea of Cortez endangered fish species and those requiring special protection would be affected, such as: the most rare and scarce cetacean in the world, the sea cow and the Totoaba. Also, commercial fishing in the area would be affected, especially shrimp and two species of curvina, fish which have not been seen in significant numbers in the last 25 years.

6. As far as the existing flora in the reach between Morelos Dam and the mouth of the Colorado River at the Sea of Cortez, in recent years, 33,000 hectares of native riparian vegetation has been reestablished in the watershed, composed of poplars, willows, mesquites and salty pines, among other species which are fundamental to the ecosystem since many of them are used for nesting by a great number of birds such as the Yuma Clapper, the yellow seagull, the sea dove and the royal blue swan, among others, same which would be affected by these measures.

It should be pointed out that the identified effects could weaken the cooperative bilateral relations regarding the Delta, which include the coordination between the contiguous protected natural areas, the environmental management of the basin and binational accords for habitat protection, of wetlands, and migratory species in which both countries are signatories such as the Ramsar Convention, the Management Plan for North American Aquatic Birds and the UNESCO Network of Reserves.

Finally, let me point out to you that the government of Mexico is not in agreement with putting into effect the proposed plan without considering the measures which would be implemented to mitigate its impact in Mexican territory. Also, I emphasize our request that the environment be considered a user of the excess flows which would be declared for the lower basin of the Colorado River. We support the goodwill of the Department of the Interior of the United States in proposing a " zero net loss of benefit to the environment" in the development of the surplus criteria.

I take this opportunity to reiterate to you the assurances of my distinguished consideration.

SINCERELY,
Border Affairs Coordinator
(SIGNED)
ENG. JAIME TINOCO RUBI

cc: Eng. Prospero A. Ortega Moreno, General Manager of Construction
cc: Eng. Arturo Herrera Solis - Mexican Commissioner - IBWC
cc: Dr. Francisco Oyarzábal Tamargo - Regional Manager of the Peninsula of Baja California

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August 22, 2000
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4: Comment noted. Additional analysis regarding salinity at the NIB has also been added to the FEIS, in Section 3.16.5.

5: Section 3.16.6 of the EIS discusses potential effects on the sea cow (Vaquita) and the totoaba, as well as other endangered species known to occur in Mexico.

6: Section 3.16.6 of the FEIS includes additional information about potential impacts of the proposed interim surplus criteria on special status species and their habitat which may occur in both the U.S. and Mexico, including the Yuma Clapper Rail and Southwestern Willow Flycatcher. The description of the affected environment acknowledges that habitat along the river is also used by many other species of concern.

7: Reclamation is continuing its consultation and coordinaton with the IBWC. See FEIS Sections 3.16 and 5.3.2 for updated information.

8: Comment Noted. Please see updated Section 3.16, Transboundary Impacts.

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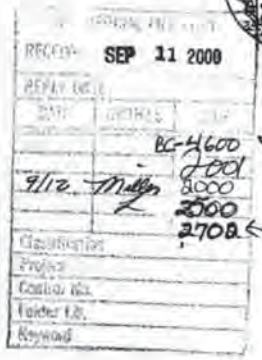
ADDITIONAL TRIBE

(93)

Kaibab Band of Paiute Indians



September 5, 2000

Mr. Robert W. Johnson, Regional Director
Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, Nevada 89006-1470

Ref: C-2502; ENV-6.00
DEIS Colorado River Interim Surplus Criteria

Dear Mr. Johnson:

We are pleased to make comment on the DEIS Colorado River Interim Surplus Criteria. The environmental impacts address mostly those affected areas of users of the river below Hoover Dam. Also, there are some issues which are out of our comment range for now which will address State and Tribal water usage agreements along the Colorado River.

1 The affects and consequences on the environment will occur during and after the spring snowmelt and summer rains. Obviously, it will affect Tribal and State water use during periods of droughts and floods. It will affect the vegetation, wildlife and threaten & endangered species habitat and erode beaches and other land areas during these seasonal periods. The number of Tribes being consulted on this Draft

2 Environmental Impact Statement must seriously be considered to be included as part of a working group to develop agreements, etc. Direct communication is more likely to result in lasting agreements needed to move forward with planning for the Colorado River.

3 We trust that we have your commitment to be flexibile and create partnerships in developing deference and priorities, with Tribes, in the effort to protect the Colorado River ecosystem and its resources. Water is and has been an intrinsec part of the Native American homelands. As is noted in the DEIS, "The

4 interim surplus criteria will not alter the quantity or priority of tribal entitlements" and "...the Tribes have the highest priority water rights on the Colorado River." Another concern we have is with the quality of the water for down river users. Assure us that the water will not be polluted to the point of being toxic.

Sincerely,

VIVIENNE-CARON JAKE, Director
KPT Environmental Program

cc: File
: Tribal Administration

Tribal Affairs
HC 65 Box 2
Pipe Spring, Arizona 86022
Phone (520) 643-7245
Fax (520) 643-7260

1: Potential environmental effects of interim surplus criteria are addressed in the EIS. Specifically, effects on water supply are discussed in Section 3.4; effects on special-status species and habitat are discussed in Section 3.8; and effects on the frequency of beach/habitat-building flow (BHBFs) and low steady summer flow releases from Glen Canyon Dam are discussed in Section 3.6.

2: Comment noted. Reclamation has consulted with, and will continue to work with potentially affected Tribes to address their concerns. Tribal consultations undertaken in association with interim surplus criteria are discussed in Section 5.4.

3: Comment noted.

4: Potential effects on water quality are discussed in Section 3.5, and environmental commitments associated with water quality are discussed in Section 3.17 of the FEIS.

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ORAL COMMENTS

Oral Comments Provided by Mr. Wade Noble

The following is a written transcript of oral comments provided by Mr. Wade Noble at the August at August 24, 2000, public hearing held to receive comments on the Colorado River Interim Surplus Criteria Draft Environmental Impact Statement:

MR. WADE NOBLE. My name is Wade Noble. I'm an attorney from Yuma. I represent three irrigation districts in the Yuma area, the principal of which is the Wellton-Mohawk Irrigation & Drainage District.

1 We support the Seven Basin States proposal generally. We don't want to comment or elaborate more on the well-articulated positions regarding the effects of the proposal on energy resources, principally Hoover resources. Bob and the Power Authority set those forth pretty well, but down where we are, at the bottom of the river, it's pretty clear to us that it's not just the flows that you have coming out to generate the power but it's the head loss. So we are concerned that you're going to have a natural decrease in head loss due to reduce inflows into Hoover so much 2 that they're predicting, as the Power Authority noted and we have noted as well, as much as a 35 percent decrease in capacity just over the next year or so because the levels of the lake will be lowering.

We are somewhat concerned about the Seven Basin States proposal with regard to the steps that California must take and the interim periods and the criteria for meeting those goals and what happens if they do not meet those goals. As Mr. Dishlip explained this evening, if they don't meet the goals, it's the understanding of the three Basin States that the agreement falls apart and the interim surplus criteria go away and that we go back to a more conservative management of the river under those circumstances. That creates concerns for Wellton-Mohawk.

3 One of the items in the Seven Basin States proposal is for a 15-year extension of the interim period on the savings for the Coachella Valley ditch lining canal lining. And if that interim surplus criteria is terminated because the surplus no longer exists on the river, then Reclamation has to deal with the issue of 138,000 acre-feet that they've got to come up with that they don't have to come up with now or during any period in which the interim period is in effect. And so we wonder what happens under the Seven Basin States proposal if it falls apart because California doesn't meet the goal. Does that mean that there will be an immediate declaration of nonsurplus, so to speak, on the river, which will cause a problem particularly for Reclamation and, since it's directly related to Wellton-Mohawk, the bypass flows that occur as a result that are being credited now.

And we would further like to comment that among considerations that are being given has to 4 do with the beneficial use and return flows into the river, and we're concerned that any water that would return to the river that would be beneficially used if it were not otherwise consumed by such things as phreatophytes ought to be considered regardless of where it is returned to the river.

1: A new alternative, the Basin States Alternative, has been included in the FEIS. This alternative was derived from the Seven States proposal, and has been selected by Reclamation as the preferred alternative.

2: Comment noted. Section 3.10 of the FEIS discusses potential reductions in Hoover Dam powerplant capacity under baseline conditions and each of the alternatives.

3: Comment noted. For the analysis in the FEIS, it was assumed that the Yuma Desalting Plant would become operational in 2022 under baseline conditions as well as under interim surplus criteria (See Section 3.3.3.3, General Modeling Assumptions). The suspension of the tiered interim surplus criteria prior to the end of the 15-year period is discussed in Section 1.4.1. Attachment I to the FEIS includes draft guidelines for the administration of the interim surplus criteria under the Basin States Alternative which address standards for progress by California.

4: Evaluation of the method of accounting for return flow and the definition of beneficial use are not within the purpose and need for the proposed action and are therefore not addressed in the FEIS.

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Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead

Final Environmental Impact Statement
November 2007

Note: All files are formatted as PDF files and require Adobe Acrobat Reader to view.
To navigate to specific volumes of links, click on the index below.

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Executive Summary	326 KB
Chapter 1 - Purpose and Need	512 KB
Chapter 2 - Description of Alternatives	219 KB
Chapter 3 - Affected Environment	2.0 MB
Chapter 4 - Environmental Consequences	3.5 MB
Chapter 5 - Other Considerations & Cumulative Impacts	87 KB
Chapter 6 - Consultation and Coordination	17 KB
Index, References, Acronyms, Glossary, Preparers, and Distribution	297 KB
VOLUME II - Appendices A thru L - Cover/Table of Contents	137 KB
Appendix A - CRSS Model Documentation	210 KB
Appendix B - Colorado River System Facilities & Current River System Operations from Lake Powell to SIB	418 KB
Appendix C - Upper Basin States Depletion Schedules	15 KB
Appendix D - Lower Division States Depletion Schedules	169 KB
Appendix E - Colorado River Water Entitlements and Priority Systems within Arizona, California, and Nevada	101KB
Appendix F - Water Quality Modeling Documentation	262 KB
Appendix G - Shortage Allocation Model Documentation	608 KB
Appendix H - Socioeconomics Data	282 KB
Appendix I - Public Outreach, Coordination and Consultation Efforts	2.9 MB
Appendix J - Seven Basin States' Proposals Regarding Colorado River Interim Operations	3.4 MB
Appendix K - "Conservation Before Shortage II" Proposal	1.7 MB
Appendix L - Federal Register Notices	869 KB
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Appendix M - Modeling Assumptions: Lake Mead Storage & Delivery of Conserved System & Non-System Water	92 KB
Appendix N - Analysis of Hydrologic Variability Sensitivity	830 KB
Appendix O - Analysis of Power & Energy Impacts to Glen Canyon Dam, Shortage Criteria EIS	204 KB
Appendix P - Additional CRSS Modeling Output	5.1 MB

Appendix Q - Modeling Assumptions with Regard to Future Water Deliveries to Mexico Sensitivity Analysis	116 KB
Appendix R - Biological Assessment	2.6 MB
Appendix S - Draft Interim Guidelines for the Operation of Lake Powell and Lake Mead	94 KB
Appendix T - NRC Executive Summary	681 KB
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Public Hearing Transcripts	1.8 MB

Webmaster: [redacted]-lcr-webcomments@usbr.gov
Updated: November 2007