UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

DELTA SMELT CONSOLIDATED CASES	1:09-cv-00407 OWW DLB 1:09-cv-00480-OWW-GSA 1:09-cv-00422-OWW-GSA 1:09-cv-00631-OWW-DLB 1:09-cv-00892-OWW-DLB
SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, *et al.* v. SALAZAR, *et al.* (1:09-cv-00407 OWW DLB)	
STATE WATER CONTRACTORS v. SALAZAR, *et al.* (1:09-cv-00480-OWW-GSA)	PARTIALLY CONSOLIDATED WITH: 1:09-CV-01201-OWW-DLB
COALITION FOR A SUSTAINABLE DELTA, *et al.* v. UNITED STATES FISH AND WILDLIFE SERVICE, *et al.* (1:09-cv-00422-OWW-GSA)	MEMORANDUM DECISION RE CROSS MOTIONS FOR SUMMARY JUDGMENT (DOCS. 548, 549, 550, 658, & 661)
METROPOLITAN WATER DISTRICT v. UNITED STATES FISH AND WILDLIFE SERVICE, *et al.* (1:09-cv-00631-OWW-DLB)	
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I. INTRODUCTION

These consolidated cases arise out of the continuing war over protection of the delta smelt (*Hypomesus transpacificus*), an ESA-threatened species, and associated impacts to the water supply for more than half of the State of California. Plaintiffs, San Luis & Delta Mendota Water Authority ("SLDMWD") and Westlands Water District, Metropolitan Water District of Southern California, State Water Contractors ("SWC"), Coalition for a Sustainable Delta and Kern County Water Agency, Stewart & Jasper Orchards, Arroyo Farms, LLC, and King Pistacho Grove, and Family Farm Alliance, move for summary judgment on their numerous remaining claims against the United States Fish and Wildlife Service's ("FWS") December 15, 2008 Biological Opinion addressing the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") on the threatened delta smelt (*Hypomesus transpacificus*). Doc. 550. Plaintiff-in-Intervention, the California Department of Water Resources ("DWR") filed a separate motion for summary judgment on narrower grounds. Docs. 548 & 549. Federal Defendants, the United States Department of the Interior, FWS, and the United States Bureau of Reclamation ("Reclamation"), and Defendant Intervenors, Natural Resources Defense Council and The Bay Institute, oppose and cross move for summary judgment on all remaining claims. Docs. 658 & 661. Plaintiffs and DWR replied.

Docs. 697 & 695. The motion came on for hearing on July 8 & 9, 2010. After oral argument, the parties submitted supplemental briefing on a limited set of issues. Docs. 746-49.

II. PROCEDURAL HISTORY

FWS's 2005 biological opinion ("2005 Smelt BiOp") found that the proposed coordinated operations of the SWP and CVP will have no adverse effect on the continued existence and recovery of the Delta Smelt and its critical habitat. The 2005 BiOp was remanded to FWS as arbitrary and capricious. Order, *NRDC v. Kempthorne*, 1:05-cv-1207 (E.D. Cal. May 25, 2007), Doc. 323. Following an extensive evidentiary hearing, the Court issued an interim remedial order and Findings of Fact and Conclusions of Law ("Findings"), which covered, among other things, the effects on delta smelt of negative flows in Old and Middle Rivers ("OMR"), two distributary channels of the San Joaquin River. *See* Interim Remedial Order Following Summary Judgment and Evidentiary Hearing ("Int. Rem. Order"), *NRDC v. Kempthorne*, Doc. 560 (Dec. 14, 2007); Findings re: Delta Smelt ESA Remand and Reconsultation ("Int. Rem. Findings"), *NRDC v. Kempthorne*, Doc. 561 (Dec. 14, 2007).[1]

[1] There is limited merit to Plaintiffs' contention that these prior findings are "not relevant." *See* Doc. 551 at 91. These findings are not dispositive, but cannot be ignored, as they are based on extensive scientific testimony subject to cross-examination by many of the Plaintiffs in the present case. The order remanded the 2005 BiOp back to FWS "for further consideration consistent with [the] Court's orders and the requirements of law." Int. Rem. Order at 2 (emphasis added).

Reclamation and DWR were ordered, among other things, to implement a winter "pulse flow" in OMR of no more negative than -2,000 cubic feet per second ("cfs"), and to "operate the CVP and SWP to achieve a daily average net upstream (reverse) flow in the OMR not to exceed 5,000 cfs on a seven-day running average" during a defined period in the spring. Int. Rem. Order at 5-7; *see also* Int. Rem. Findings at 15-20.

FWS issued a new delta smelt biological opinion on December 15, 2008 ("2008 Smelt BiOp" or "BiOp"). *See* Administrative Record ("AR") at 00001-00411.[2] This BiOp concluded that proposed CVP and SWP operations are "likely to jeopardize the continued existence of" the delta smelt and "adversely modify" its critical habitat. BiOp at 276-79. The BiOp includes a required Reasonable and Prudent Alternative ("RPA") designed to allow the projects' continued operations without causing jeopardy to the species or adverse modification to its critical habitat. *Id.* at 279-85. The RPA includes operational components designed to reduce entrainment of smelt during critical times of the year by controlling (limiting) water exports from the Delta by the Projects. *Id. at* 279-85.

Component 1, to protect of the adult delta smelt life stage, consists of two Actions related to OMR flows.

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[2] Citations to the 2008 delta smelt BiOp will be to the BiOp's original pagination, not Administrative Record page numbers.

- **Action 1, to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cfs on a 14-day average and no more negative than -2,500 cfs for a 5-day running average. *Id. at* 280-82, 329-51.**
- **Action 2, to protect adult delta smelt that have migrated upstream and are present in the Delta prior to spawning. Action 2 is triggered immediately after Action 1 concludes or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.**

Component 2 (Action 3), to protect larval and juvenile delta smelt, requires OMR flows to be kept between -1,250 and -5,000 cfs, after Component 1 is completed, when Delta water temperatures reach 12° Celcius ("C"), or when a spent female smelt is detected in trawls or at salvage[3] facilities. *Id. at* 282, 357-58. Component 2 continues until June 30 or when the Clifton Court Forebay water temperature reaches 25° C. *Id. at* 282, 368.

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[3] It is undisputed that Project pumping "kills Delta smelt by sucking them directly into the pumps; by drawing them into fish 'salvage' facilities which collect fish diverted from entering the pumps, a process that kills the smelt; and drawing smelt into the SWP's Clifton Court Forebay from which the fish cannot escape and where they will die even if they are not drawn into the salvage facilities or the pumps." Int. Rem. Findings ¶ 19.

Component 3 (Action 4), to improve habitat for delta smelt growth and rearing, requires sufficient Delta outflow to maintain average mixing point locations of Delta outflow and estuarine water inflow ("X2"[4]) from September to December, depending on water year type, in accordance with a specifically described "adaptive management process" overseen by FWS. *Id. at* 282-83, 369.[5]

Component 4 (Action 6) (Habitat Restoration), requires DWR to create or restore 8,000 acres of intertidal and subtidal habitat in the Delta and Suisun Marsh within 10 years. *Id. at* 283-84, 379.

Component 5 (Monitoring and Reporting), requires Reclamation and DWR to gather and report information to ensure proper implementation of the RPA actions, achievement of physical results, and evaluation of the effectiveness of the actions on the targeted life stages of delta smelt, so that the actions can be refined, if needed. *Id. at* 284-85, 328, 375.

The first of the six consolidated challenges to the BiOp was filed on March 3, 2009. Doc. 1. Plaintiffs moved for a

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[4] X2 is the location in the Delta where the salinity is two parts per thousand, measured as the distance upstream from the Golden Gate. *Consolidated Delta Smelt Cases*, 717 F. Supp. 2d 1021, 1029 (E.D. Cal. May 27, 2010); BiOp at 149.

[5] Action 5, which is not formally associated with any "Component" of the RPA, prohibits FWS from installing the Head of Old River Barrier, a physical barrier designed to reduce the number of out-migrating salmon smolts entering Old River, in the spring if delta smelt entrainment triggers are met. BiOp at 175, 377-78.

preliminary injunction on April 24, 2009 to prevent Reclamation from implementing Component 2 of the RPA, alleging that FWS violated the National Environmental Policy Act ("NEPA") and the ESA. *See* Doc. 31.

On May 22, 2009, the Court granted that motion in part, finding that Plaintiffs were likely to succeed on the merits of their NEPA claim and requiring FWS to make specific written findings to justify OMR flow restrictions. *See* Doc. 84; *see also* Doc. 94, Findings re Mot. for Prelim. Inj. (May 29, 2009). Defendants complied with that Order, submitting weekly notices of FWS's OMR flow decisions. *See, e.g.*, Doc. 111, Notice of OMR Flow Decision (June 11, 2009). The Court's May 2009 preliminary injunction ruling was not based on Plaintiffs' ESA claims. Doc. 94 at 43.

Plaintiffs amended their Complaint, joined and added claims against Reclamation, *see* Doc. 292, and moved for summary judgment on their NEPA claim, *see* Doc. 245. A November 13, 2009, ruling granted summary adjudication in part, based on Reclamation's failure to prepare an environmental impact statement before provisionally accepting and implementing the BiOp and its RPA Actions. Doc. 399.

Summary judgment for Defendants was granted on: (1) Stewart and Jasper Orchards' Commerce Clause claim that the ESA did not apply to protect delta smelt, a purely intra-state species, Doc.

339; and (2) claims that the BiOp violated regulations governing formulation of the RPA by not including required information in the BiOp text, Doc. 354.

Plaintiffs then filed three temporary restraining order motions over a six week period -- all of which were denied. *See* Docs. 555 & 583; *see also* 3/16/10 Hrg. Tr. at 86-88. Plaintiffs next sought a preliminary injunction against implementation of RPA Component 3. An evidentiary hearing was held from April 2, 2010 through April 7, 2010. Docs. 644, 652-54. Findings Re Plaintiffs' Request for Preliminary Injunction issued May 27, 2010 ("PI Decision"). Doc. 704. The PI Decision confirmed Plaintiffs had succeeded on their NEPA claim and found Plaintiffs were likely to succeed on the merits of their ESA claim:

> Although the premise underlying Component 2 -- that the species may be jeopardized by increased negative flows occasioned by export pumping -- has record support, FWS has failed to adequately justify by generally recognized scientific principles the precise flow prescriptions imposed by Component 2. The exact restrictions imposed, which are inflicting material harm to humans and the human environment, are not supported by the record, making it impossible to determine whether RPA Component 2 [is] overly protective. Judicial deference is not owed to arbitrary, capricious, and scientifically unreasonable agency action.

Id. at 122. Plaintiffs presented evidence under NEPA on the balance of the hardships that social dislocation, unemployment, and other threats to human health and safety were caused by interdiction of Plaintiffs' water supply. *See id*. at 123.

Countervailing irreparable harm was found, because "the species and its critical habitat[] are entitled to protection under the ESA." *Id.* at 124. Acknowledging the existence of legal and equitable grounds for injunctive relief, further evidence was requested on the "status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws." *Id.* at 125. Specifically, to establish "that Plaintiffs' proposed remedy of a flat -5,600 cfs ceiling on negative OMR flows will not jeopardize the continued existence of the species and/or adversely modify its critical habitat." *Id.*

A May 28, 2010 status conference sought to determine whether a mutually-agreeable interim operational plan could be implemented. Doc. 706. On June 22, 2010, the parties stipulated to a joint operational plan to maintain OMR flows so as not to be more negative than -5,000 cfs, unless certain, defined salvage triggers required a further reduction in OMR flows. Doc. 724.

After these dispositive motions were filed, the National Academy of Sciences, completed a comprehensive review of the BiOp, and concluded that the BiOp and the RPA Actions were "scientifically justified." *See* National Academy of Sciences, National Research Council, A Scientific Assessment of Alternatives for Reducing Water Management Effects on Threatened and Endangered Fishes in California's Bay Delta at 3. Doc. 635.

This post-decisional document is not part of the Administrative Record ("AR") and no legal justification exists to supplement the AR to include it.

Additionally, a scientific peer review panel was convened by the private consulting firm, Post Buckley Shuh and Jernigan ("PBS&J"), at the request of Plaintiff Family Farm Alliance ("FFA") in connection with FFA's administrative petition under the Information Quality Act ("IQA"). *See Family Farm Alliance v. Salazar*, 09-cv-1201 OWW-DLB (E.D. Cal.), Doc. 27, Ex. A. This document is part of the administrative record in the *Family Farm Alliance* IQA case, not the smelt AR. There is no basis to consider this document for non-IQA claims.

III. STATUS OF THE SPECIES

The delta smelt was listed as a threatened species under the ESA on March 5, 1993. 58 Fed. Reg. 12,854 (March 5, 1993). Critical habitat was designated for the delta smelt on December 19, 1994. 59 Fed. Reg. 65,256 (Dec. 19, 1994). Once an abundant species in the Bay-Delta ecosystem as recently as thirty years ago, the delta smelt is now in imminent danger of extinction. PI Decision, Finding of Fact ¶ 10. All the evidence shows a significant decline in smelt abundance since 2000, recently up to three orders of magnitude below historic lows. *Id.* The latest fall mid-water trawl ("FMWT") abundance index for the species was 17, the lowest level ever recorded. *Id.*

On April 7, 2010, FWS announced that reclassifying the delta smelt from a threatened to an endangered species was warranted, but precluded by higher priority listing actions. 75 Fed. Reg. 17,667 (Apr. 7, 2010). The direct mortality of delta smelt by entrainment at the CVP-SWP pumps, as well as the destruction and adverse modification of its habitat in the Delta caused by water exports, were important factors in this determination. *Id.* at 17,669, 17,671 ("The operation of State and Federal export facilities constitute a significant and ongoing threat to delta smelt through direct mortality by entrainment"). As a result of the "immediate and high magnitude threats" confronting the species, the delta smelt was assigned a listing priority number of 2.[6] *Id.* at 17,675.

IV. SUMMARY OF MOTION

A. Plaintiffs' Motion.

Plaintiffs' motion advances the following grounds and contentions:

(1) FWS failed to rely on the "best available science" by making fundamental scientific errors in its analysis of the impacts of Project Operations on the species by:

(a) Relying on raw salvage numbers in quantitative impact analyses;

[6] "Warranted but precluded" species are assigned listing priority numbers from 1 to 12, with 1 being the highest priority. *Id.* at 17,674.

(b) Failing to conduct a life cycle analysis;

(c) Comparing the results of two entirely different, incompatible flow and salinity models; and

(d) Selectively excluding certain data for one purpose, but then unjustifiably using it for another;

(2) The BiOp's Project Effects Analysis is arbitrary and capricious because FWS:

(a) Assumed that Project operations drive hydrological conditions in the Delta and did not explain or justify this attribution;

(b) Evaluated the impacts of other (i.e., non-Project) stressors erroneously and inconsistently; and

(c) Improperly characterized summer food supply suppression, invasive species, and pollution and contaminants as indirect effects of Project Operations;

(3) The BiOp is arbitrary and capricious because it does not distinguish between discretionary and nondiscretionary actions, improperly inflating the alleged effects of Project Operations;

(4) The BiOp's RPA is unlawful because FWS did not conduct the specific analyses required by the ESA and FWS' own RPA regulation, 50 C.F.R. § 402.02, because neither the

BiOp nor the AR demonstrate that FWS analyzed or applied the first three (of four) § 402.02 factors;

(5) FWS illegally arrogated to itself Project operating authority in derogation of Reclamation and DWR;

(6) FWS acted arbitrarily and capriciously by disregarding the Information Quality Act ("IQA") when preparing and issuing the BiOp;

(7) FWS violated NEPA by not considering the environmental impacts of issuing the BiOp and RPA.

(8) Reclamation violated its legal duties by accepting FWS' inherently flawed BiOp.

B. DWR's Motion.

DWR's attacks three aspects of the BiOp:

(1) By relying on a comparison of CALSIM II model runs with what the BiOp terms "historic" data (which was actually generated by the Dayflow model), the BiOp's analysis of the effects of the proposed action on smelt habitat does not yield meaningful information and violates the ESA's best available science requirement. This analysis further violates the APA because FWS did not adequately articulate any rational connection between the facts found based on these comparisons, and its conclusions regarding the Projects' effects on the smelt.

(2) Component 3 of the RPA, also referred to in the BiOp as Action 4, is intended to mitigate the effects of the proposed action on smelt habitat, by requiring the Projects to maintain X2 in specified locations, depending on the type of water year. The BiOp, however, lacks sufficient explanation as to the basis for the specific prescriptions imposed by this Component, in violation of the APA. Moreover, to the extent that the record reveals that these prescriptions are based, even in part, on the methods used in the effects analysis, they violate the ESA's "best available science" mandate.

(3) The Incidental Take Statement ("ITS") is defective. First, its estimates are based on the average take from water years 2006 through 2008, which predicts the ITS will likely be exceeded in half of all years. Second, FWS erroneously misapplied its own data with the result that the BiOp claims that the ITS was only exceeded in five of the previous sixteen years, rather than accurately stating that it was exceeded in eleven of the sixteen years. Third, the ITS take estimate is based on a data sample that is too small to provide a reasonable prediction of take under the RPA. These defects violate the ESA's "best available science"

requirement, the ESA's ITS requirements, and the APA.

V. STANDARD OF DECISION

Summary judgment is appropriate when the pleadings and the record demonstrate that "there is no genuine dispute as to any material fact and that the moving party is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c). The claims in this case involve FWS's issuance of a biological opinion, which is a final agency action subject to judicial review under the APA, 5 U.S.C. § 702. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 524 F.3d 917, 925 (9th Cir. 2008) ("*NWF v. NMFS II*"). A court conducting judicial review under the APA may not resolve factual questions, but instead determines "whether or not as a matter of law the evidence in the administrative record permitted the agency to make the decision it did." *Sierra Club v. Mainella*, 459 F. Supp. 2d 76, 90 (D.D.C. 2006) (quoting *Occidental Eng'g Co. v. INS*, 753 F.2d 766, 769 (9th Cir. 1985)). "[I]n a case involving review of a final agency action under the [APA] ... the standard set forth in Rule 56(c) does not apply because of the limited role of a court in reviewing the administrative record." *Id.* at 89. In this context, summary judgment becomes the "mechanism for deciding, as a matter of law, whether the agency action is supported by the administrative record and otherwise consistent with the APA standard of review." *Id.* at 90.

VI. BASIC LEGAL FRAMEWORK

A. Review under the APA.

Administrative Procedure Act ("APA") invalidation of a biological opinion requires Plaintiffs to prove that FWS's action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A).

(1) Record Review.

APA review of a biological opinion is "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. FWS*, 273 F.3d 1229, 1245 (9th Cir. 2001). Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA*, 615 F.2d 794, 811-12 (9th Cir. 1980). Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied. *Lands Council v. Powell*, 395 F.3d 1019, 1030 (9th Cir. 2005).

Here, as evidentiary rulings explained, *see, e.g.*, Docs. 387, 392 (10/19/09 Hrg. Tr), 406, 407, 462, 740 (7/8/10 Hrg.), 750, expert testimony has been considered only for explanation of

technical terms and complex scientific subject matter beyond the Court's knowledge; and to understand the agency's explanations, or lack thereof, and the parties' arguments.

(2) Deference to Agency Expertise.

A Court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential to making an informed decision. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 422 F.3d 782, 798 (9th Cir. 2005) ("*NWF v. NMFS I*"). A court "may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action." *River Runners for Wilderness v. Martin*, 593 F.3d 1064, 1070 (9th Cir. 2009):

> In conducting an APA review, the court must determine whether the agency's decision is "founded on a rational connection between the facts found and the choices made ... and whether [the agency] has committed a clear error of judgment." *Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife*, 273 F.3d 1229, 1243 (9th Cir. 2001). "The [agency's] action ... need be only a reasonable, not the best or most reasonable, decision." *Nat'l Wildlife Fed. v. Burford*, 871 F.2d 849, 855 (9th Cir. 1989).

Id.

Although deferential, judicial review under the APA is designed to "ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas*, 824 F.2d 745, 748 (9th Cir. 1987) (internal citations omitted). "The deference accorded an

agency's scientific or technical expertise is not unlimited." *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir. 2001) (internal citations omitted).

> [An agency's decision is] arbitrary and capricious if [it] has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983); *see also Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971) (reviewing court may overturn an agency's action as arbitrary and capricious if the agency failed to consider relevant factors, failed to base its decision on those factors, and/or made a "clear error of judgment"), *overruled on other grounds by Califano v. Sanders*, 430 U.S. 99, 105 (1977)).

More generally, "[u]nder the APA 'the agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made.'" *Humane Soc. of U.S. v. Locke*, --- F.3d ---, 2010 WL 4723195, *5 (9th Cir. 2010) (quoting *Motor Vehicle Mfrs. Ass'n*, 463 U.S. at 43). "The reviewing court should not attempt itself to make up for an agency's deficiencies: We may not supply a reasoned basis for the agency's action that the agency itself has not given." *Id.*

(3) General Obligations Under the ESA.

ESA Section 7(a)(2) prohibits agency action that is "likely to jeopardize the continued existence" of any endangered or threatened species or "result in the destruction or adverse modification" of its critical habitat. 16 U.S.C. § 1536(a)(2).

To "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02; *see also NWF v. NMFS II,* 524 F.3d 917 (rejecting agency interpretation of 50 C.F.R. § 402.02 that in effect limited jeopardy analysis to survival and did not realistically evaluate recovery, thereby avoiding an interpretation that reads the provision "and recovery" entirely out of the text). An action is "jeopardizing" if it keeps recovery "far out of reach," even if the species is able to cling to survival. *NWF v. NMFS II,* 524 F.3d at 931. "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *Id.* at 930.

To satisfy this obligation, the federal agency undertaking the action (the "action agency") must prepare a "biological

assessment" that evaluates the action's potential impacts on species and species' habitat. 16 U.S.C. § 1536(c); 50 C.F.R. § 402.12(a). If the proposed action "is likely to adversely affect" a threatened or endangered species or adversely modify its designated critical habitat, the action agency must engage in "formal consultation" with FWS to obtain its biological opinion as to the impacts of the proposed action on the listed species. *See* 16 U.S.C. § 1536(a)(2), (b)(3); *see also* 50 C.F.R. § 402.14(a), (g). Once the consultation process has been completed, FWS must give the action agency a written biological opinion "setting forth [FWS's] opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat." 16 U.S.C. § 1536(b)(3)(A); *see also* 50 C.F.R. § 402.14(h).

If FWS determines that jeopardy or destruction or adverse modification of critical habitat is likely, FWS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate subsection (a)(2) of this section and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A). "Following the issuance of a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to 16 U.S.C. § 1536(e)." *Nat'l Ass'n of Home Builders*

v. Defenders of Wildlife, 551 U.S. 644, 652 (2008).

(4) Best Available Science.

Under the ESA, an agency's actions must be based on "the best scientific and commercial data available." 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8) ("In formulating its Biological Opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available...."). A failure by the agency to utilize the best available science is arbitrary and capricious. *See Pac. Coast Fed'n of Fishermen's Assns. v. Gutierrez,* 606 F. Supp. 2d 1122, 1144 (E.D. Cal. 2008).

"The obvious purpose of the [best available science requirement] is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear*, 520 U.S. 154, 176 (1997).

> While this no doubt serves to advance the ESA's overall goal of species preservation, we think it readily apparent that another objective [of the best available science requirement] (if not indeed the primary one) is to avoid needless economic dislocation produced by agency officials zealously but unintelligently pursuing their environmental objectives. That economic consequences are an explicit concern of the ESA is evidenced by § 1536(h), which provides exemption from § 1536(a)(2)'s no-jeopardy mandate where there are no reasonable and prudent alternatives to the agency action and the benefits of the agency action clearly outweigh the benefits of any alternatives. We believe the "best scientific and commercial data" provision is similarly intended, at least in part, to prevent uneconomic (because erroneous) jeopardy determinations.

Id. at 176-77.

A decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. *See Ctr. for Biological Diversity v. Rumsfeld*, 198 F. Supp. 2d 1139, 1156 (D. Ariz. 2002). The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne*, 530 F.3d 991, 998 (D.C. Cir. 2008) (citation omitted).

What constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination on review. *Baltimore Gas & Elec. Co. v. Natural Res. Defense Council*, 462 U.S. 87, 103 (1983) (a court must be "at its most deferential" when an agency is "making predictions within its area of special expertise, at the frontiers of science"). As explained in the *en banc* decision in *Lands Council*, 537 F.3d at 993, courts may not "impose on the agency their own notion of which procedures are best or most likely to further some vague, undefined public good." In particular, an agency's "scientific methodology is owed substantial deference." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv.*, 378 F.3d 1059, 1066 (9th Cir. 2004).

When specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council*, 537 F.3d at 1000 (quoting *Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 378 (1989)). Mere uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1337 (9th Cir. 1992) (upholding biological opinion, despite uncertainty about the effectiveness of management measures, because decision was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1300 (E.D. Cal. 2000) (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits the [FWS] to take action based on imperfect data, so long as the data is the best available"). FWS "must utilize the 'best scientific ... data available,' not the best scientific data possible." *Building Indus. Ass'n v. Norton*, 247 F.3d 1241, 1246 (D.C. Cir. 2001), cited with approval in *Kern County Farm Bureau v. Allen*, 450 F.3d 1072, 1080-81 (9th Cir. 2006) ("Absent superior data occasional imperfections do not violate" the ESA best available data standard); *see also Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670, 680 (D.D.C. 1997) (best available science standard does not require "conclusive evidence," only that agency use best

science available and not ignore contrary evidence).

The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar*, 566 F.3d 870, 879 (9th Cir. 2009), held that an agency may not rely on "ambiguous studies as evidence" to support findings made under the ESA. Because the studies did not lead to the conclusion reached by FWS, the Ninth Circuit held that these studies provided inadequate support in the administrative record for the determination made by FWS. *Id.*; *see also Rock Creek Alliance v. U.S. Fish & Wildlife Service*, 390 F. Supp. 2d 993, 1008 (D. Mont. 2005) (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion). Alternatively, the presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned, *Greenpeace v. NMFS*, 80 F. Supp. 2d 1137, 1147 (W.D. Wash. 2000), or if the agency disregards available scientific evidence better than the evidence on which it relies, *Kern County Farm Bureau*, 450 F.3d at 1080.

Courts routinely perform substantive reviews of record evidence to evaluate the agency's treatment of best available science. The judicial review process is not one of blind acceptance. *See, e.g., Kern County*, 450 F.3d at 1078-79

(thoroughly reviewing three post-comment studies and FWS's treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv.*, 529 F. Supp. 2d 1110, 1120 (N.D. Cal. 2007) (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn*, 645 F. Supp. 2d 929 (D. Or. 2007) (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans*, 384 F. Supp. 2d 203, 217-18 (D.D.C. 2005) (carefully considering scientific underpinnings of challenge to FWS's use of a particular model, including post decision evidence presented by an expert to help the court understand the complex model, applying one of several record review exceptions articulated in *Esch v. Yeutter*, 876 F.2d 976, 991 (D.C. Cir. 1989), which are similar to those articulated by the Ninth Circuit).

Courts are not required to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., Am. Turnboat Ass'n v. Baldrige*, 738 F.2d 1013, 1016-17 (9th Cir. 1984) (NMFS's decision under the Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data

that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs*, 701 F.2d 1011, 1030 (2d Cir. 1983) ("court may properly be skeptical as to whether an EIS's conclusions have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[]") (internal citations omitted). A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation." *N. Spotted Owl v. Hodel*, 716 F. Supp. 479, 483 (W.D. Wash. 1988) (citing *Am. Turnboat Ass'n,* 738 F.2d at 1016).

In *Conner v. Burford*, 848 F.2d 1441, 1453-54 (9th Cir. 1988), the agency attempted to defend its biological opinions by arguing that there was a lack of sufficient information to perform additional analysis. In rejecting this defense, the Ninth Circuit held that "incomplete information ... does not excuse the failure to comply with the statutory requirement of a comprehensive biological opinion using the best information available," and noted that FWS could have completed more analysis with the information that was available. *Id.* at 1454.

> In light of the ESA requirement that the agencies use the best scientific and commercial data available ... the FWS cannot ignore available biological info or fail to develop projections of ... activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions.

Id. (emphasis added).

(5) Best Available Science Standards and the Application of Analytical/Statistical Methodologies.

The above-described standards apply with equal force to the use and interpretation of statistical methodologies. As the D.C. Circuit in *Appalachian Power Co. v. EPA*, 135 F.3d 791 (D.C. Cir. 1998), explained in reviewing a challenge to a decision of the Environmental Protection Agency ("EPA") under the "arbitrary and capricious" standard of review:

> Statistical analysis is perhaps the prime example of those areas of technical wilderness into which judicial expeditions are best limited to ascertaining the lay of the land. Although computer models are "a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act," [citation] their scientific nature does not easily lend itself to judicial review. Our consideration of EPA's use of a regression analysis in this case must therefore comport with the deference traditionally given to an agency when reviewing a scientific analysis within its area of expertise without abdicating our duty to ensure that the application of this model was not arbitrary.

Id. at 802.

The model must fit the available data. *See Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 565 (D.C. Cir. 2002) ("*NWF v. EPA*") (a court will only reject the choice of a model "when the model bears no rational relationship to the characteristics of the data to which it was applied"). For example, *Oceana*, 384 F. Supp. at 220, rejected a challenge to NMFS's use of a particular analytical model that used data drawn from existing literature, even though experts "suggested that reliable take limits cannot

be established without quantitative data gathered from 'in-water' surveys." Although NMFS conceded "a thorough quantitative analysis based on empirical estimates of population size would be a superior way to analyze the impact [] on [the species]," it was undisputed that "given the paucity of information on sea turtles and the difficulties of using the data that does exist, '[a] different or more complex model [than that used by NMFS] was not available and could not even be constructed.'" *Id.* Likewise, "the fact that a given model has some imperfections does not prevent it from constituting the 'best scientific information available.'" *Oceana v. Evans*, 2005 WL 555416, *16-*17 (D.D.C. Mar. 9, 2005)(citing 16 U.S.C. § 1851(a)(2))(approving NMFS's use of a model despite known limitations, where it was the only model available and the agency supplemented its analysis with other sources to address areas where the model was unable to make accurate predictions).

VII. ANALYSIS

A. Challenges to the Effects Analysis & Related Challenges to the RPA Actions.

(1) Legal Requirements for a Project Effects Analysis.

Under section 7(a)(2) of the ESA and the Joint Consultation Regulations, FWS must "[e]valuate the effects of the action and cumulative effects on the listed species or critical habitat." 50 C.F.R. § 402.14(g)(3). FWS must then "[f]ormulate its biological opinion as to whether the action, taken together with

cumulative effects,[7] is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat." § 402.14(g)(4). The effects of the action are defined as:

> the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.

§ 402.02.

The environmental baseline includes:

> the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

Id. The baseline is described in FWS and NMFS's Joint Consultation Handbook[8] as:

> an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time. It does not include the effects of the action under review in the consultation.

Consultation Handbook 4-22.

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[7] Cumulative effects are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." 50 C.F.R. § 402.02.

[8] FWS and NMFS issued their final joint Endangered Species Handbook ("Handbook" or "Consultation Handbook") in 1999. 64 Fed. Reg. 31,285 (June 10, 1999). The entire Handbook is available at http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf.

Once the baseline, the "direct and indirect effects" of the action, and the "effects of other activities that are interrelated or interdependent with that action" are determined, 50 C.F.R. § 402.02, FWS then is required to consider whether, in light of the environmental baseline, the effects of the action, taken together with cumulative effects, are likely to jeopardize the continued existence of the listed species, 50 C.F.R. § 402.14(g).

> [An] agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.
>
> ....[The agency must] appropriately consider the effects of its actions "within the context of other existing human activities that impact the listed species." *ALCOA* [*v. Administrator, Bonneville Power Admin*], 175 F.3d [1156,] 1162 n. 6 [(9th Cir. 1999)](citing 50 C.F.R. § 402.02's definition of the environmental baseline). This approach is consistent with our instruction ... that "[t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." [*PCFFA v. U.S. Bureau of Reclamation],* 426 F.3d [1082,] 1093 [(9th Cir. 2005)](emphasis added).

NWF v. NMFS II, 524 F.3d at 930 (emphasis in original).

To jeopardize means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed

species." 50 C.F.R. § 402.02. The Consultation Handbook further provides that to "appreciably diminish the value: [means] to considerably reduce the capability of designated [critical habitat]." Consultation Handbook at 4-36. A related case found:

> interpretation of "appreciably" to mean any "perceptible" effect would lead to irrational results, making any agency action that had any effects on a listed species a "jeopardizing" action. This is not the law, as such an interpretation conflicts with other provisions of the ESA that permit incidental take of listed species.

PCFFA v. Gutierrez, 1:06-cv-00245 OWW GSA, Doc. 367 at 23-24 (citing 16 U.S.C. 1536(b)(4), 1539(1)(B)).

(2) Best Available Science Challenges to the Effects Analysis and Related Challenges to the Justification Provided for the RPA Actions.

Plaintiffs argue that the project effects analysis is predicated upon scientific errors that render the BiOp and its conclusion that project operations jeopardize the delta smelt arbitrary, capricious and an abuse of discretion:

> The Project Effects Analysis is the heart of the section 7 consultation process, providing the basis for FWS' jeopardy and adverse modification determinations and for formulating the RPA. In this case, FWS began the Project Effects Analysis of the 2008 Smelt BiOp with a remarkable assumption: "The following analysis assumes that the proposed CVP/SWP operations affect delta smelt throughout the year either directly through entrainment or indirectly through influences on its food supply and habitat suitability." BiOp at 203 (AR 000218.) This assumption plainly violates the "best available science" required by the ESA. The science, including the reports that FWS purports to rely on, shows that OMR flows and entrainment do not have any statistically significant effect on the delta smelt's

> population growth rate. Restricting flows has no effect on the delta smelt population's survival—such restrictions are a costly, but meaningless gesture. The same is true for [restrictions designed to control the position of] X2 [in the Fall].

Doc. 551 at 8.

Plaintiffs maintain that the best available science does not support FWS' "assumption" that "CVP/SWP operations affect delta smelt throughout the year either directly through entrainment or indirectly through influences on its food supply and habitat suitability." BiOp at 203. Plaintiffs maintain that the science demonstrates:

> (a) OMR flows have no statistically significant effect on the delta smelt population growth rate;
>
> (b) With respect to the adult population, only OMR flows more negative than -6,100 cfs will correlate to an increase in entrainment;[9]
>
> (c) The location of Fall X2 does not determine the extent and quality of suitable smelt habitat -- as with OMR flows, Fall X2 has no statistically significant effect on the population growth rate; and,
>
> (d) The CVP/SWP projects do not indirectly govern abiotic and biotic factors in the Delta that affect delta smelt abundance.

Doc. 551 at 11. Plaintiffs also maintain that there is no scientific support for the BiOp's assumption that the Projects control hydrodynamic conditions in the Delta, or for the BiOp's classification of non-Project causes of harm as "indirect

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[9] As this argument was supported exclusively by portions of the declaration of Dr. Richard B. Deriso that have been stricken, Doc. 750 at ¶ 3, this argument cannot be considered.

effects" of Project Operations. *Id.*

a. **The BiOp's General Conclusion that Entrainment by Project Operations Adversely Affects Smelt Survival & Recovery is Supported by the Record.**

The magnitude of diversions at the CVP and SWP pumping facilities influences flows throughout the Delta, including in the Old and Middle Rivers ("OMR"). BiOp at 160. When the level of diversion at the pumps is high, Old and Middle Rivers may flow backwards (in the opposite direction than they would under natural hydrological conditions) and toward the CVP and SWP natural conditions (called "negative" flows). *Id.* Negative OMR flows draw delta smelt present in the central and south Delta toward the pumps, and high negative flows increase the risk that they will be entrained at the pumps. *Id.* at 163, 253 (Figure E-7).

Unlike larger fish species, entrainment is lethal for weak-swimming delta smelt. *Id.* at 145. Relying on estimates of proportional entrainment presented by Dr. Wim Kimmerer in a 2008 paper entitled "Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta," published in the journal, San Francisco Estuary & Watershed Science ("Kimmerer (2008)"), the BiOp concludes that "[t]otal annual entrainment of the delta smelt population (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006."

Id. at 210. In years when low flows and high exports coincide with a spawning distribution of the delta smelt that includes the San Joaquin River, the loss of larval delta smelt due to entrainment can exceed 50% of the population. *Id.* at 164-65. Such losses do not occur every year, but FWS concluded the effect of these large larval loss events is "substantial when it does," particularly in light of the fact that the delta smelt is an annual fish. *Id.* at 165. Even one year where its spawning occurs "within the footprint of entrainment by the pumps" can lead to "a [severe] reduction in that year's production." *Id.*

The BiOp's Effects Analysis concludes that Project pumping operations have a "sporadically significant" adverse effect on smelt abundance:

> The population-level effects of delta smelt entrainment vary; delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics. Kimmerer (2008) estimated that annual entrainment of the delta smelt population (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006. Major population declines during the early 1980s (Moyle et al. 1992) and during the recent POD years (Sommer et al. 2007) were both associated with hydrodynamic conditions that greatly increased delta smelt entrainment losses as indexed by numbers of fish salvaged. However, currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008).

BiOp at 210 (emphasis added). This passage was based in large part on Kimmerer (2008), which states:

> Delta smelt may suffer substantial losses to export pumping both as pre-spawning adults and as larvae and early juveniles. In contrast to the situation for salmon, pre-salvage mortality has been constrained in the calculations for adult Delta smelt, and its effects eliminated from the calculations for larval/juvenile Delta smelt. Combining the results for both life stages, losses may be on the order of zero to 40 percent of the population throughout winter and spring. The estimates have large confidence limits, which could be reduced by additional sampling, particularly to estimate θ in Equation 18. If there is interest in improving these estimates further, some attempts should be made to examine the assumptions not fully tested above, particularly those used in extrapolating larval abundance to hatch dates.

AR 018877.

Plaintiffs argue that the BiOp misinterprets and misapplies Kimmerer's work. Dr. Bryan Manly, Plaintiffs' expert in the fields of biostatistics and population survey design, addressed the BiOp's statement that "delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics." Manly Decl., Doc. 397, at ¶ 7. Manly opines that "[t]his statement is unclear and confusing," and explains:

> If the Service meant only that abundance at a point in time during a single year may vary depending upon entrainment, then Kimmerer's estimates support that statement. But if, as appears more likely, the Service was relying upon Kimmerer's estimates to support a conclusion that entrainment sometimes causes abundance to vary significantly later in the same year or in following years, then the statement in the BiOp has no scientific basis.

Id. Kimmerer (2008) only estimated percentage losses of delta smelt within single year classes, and did not conclude that such

losses reduce population abundance from one year to the next. *Id.* at ¶ 8. In fact, Kimmerer (2008) contains a number of disclaimers, including the caveat that "export effects" on smelt are small relative to other factors affecting survival:

> Although the upper bound of [the 0-40% loss] range represents a substantial loss, the effect of this loss is complicated by subsequent variability in survival (Figure 17). If this variability is uncorrelated with entrainment losses, then these losses will contribute little to the variability in fall abundance index. The simplest way to evaluate this is by regression of fall midwater trawl index on winter–spring export flow, but this relationship is contaminated by the downward step change in abundance in approximately 1981–1982, together with the long-term upward trend in export flow (mainly up to the mid-1970s, *see* Kimmerer 2004). Including this step in a regression model eliminates the effect of export flow on the fall midwater trawl index (coefficient = -1.5 ± 2.4, 95% CL, 36 df). It seems unlikely that the downward step change was due to the earlier increase in export flow; furthermore, despite substantial variability in export flow in years since 1982, no effect of export flow on subsequent midwater trawl abundance is evident.
>
> This is not to dismiss the rather large proportional losses of delta smelt that occur in some years; rather, it suggests that these losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses. In the absence of density dependence, using means in Figure 15 with natural mortality, fall abundance should have been reduced by ~ 10% during 1995–2005. This would have an equivalent effect of reducing the summer–fall survival index by 10%. This would have made little difference to fall abundance in the context of the approximately 50-fold variation in summer–fall survival (Figure 17), and would be difficult to detect through correlation.
>
> Although summer–fall survival appears to dominate variability in abundance of delta smelt in fall (Figure 17), this does not imply that control of export effects would be fruitless, as these effects can be

> considerable during dry years. Management of delta smelt should incorporate any opportunities that arise to improve habitat or food supply and to reduce any negative impacts of predation or toxic contamination. However, current evidence does not provide a clear path toward improving the status of delta smelt using these factors. Manipulating export flow (and, to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence, even though export effects are relatively small. The results presented here can be used to suggest when, and under what conditions, control of export effects would be most helpful.

AR 018878. Kimmerer (2008) concludes that even though correlative analysis revealed "no effect of export flow on subsequent midwater trawl abundance," there is reason to be concerned about episodic effects caused by "large proportional losses of delta smelt that occur in some years." *Id.* As a result, according to Kimmerer (2008), population level effects should be calculated, rather than inferred from correlative analysis. *Id.* After performing such a calculation, Kimmerer (2008) concluded that entrainment reduced "the summer-fall survival index by ~10%" during 1995-2005. *Id.* Although this 10% figure was small in the context of the 50-fold variation in summer-fall survival, Kimmerer (2008) nonetheless recommended controlling export effects on smelt because "[m]anipulating export flow (and to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence, even though export effects are relatively small." *Id.* (emphasis added).

Dr. Manly is correct that Kimmerer (2008) does not support the position that entrainment has a "sporadically significant" effect on delta smelt abundance from one year to the next. However, contrary to Dr. Manly's suggestion, the BiOp does not rely on Kimmerer (2008) for this premise. The BiOp qualifies its reliance on Kimmerer (2008), consistent with the narrow scope of Kimmerer's findings:

> The population-level effects of delta smelt entrainment vary; delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics. Kimmerer (2008) estimated that annual entrainment of the delta smelt population (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006. Major population declines during the early 1980s (Moyle et al. 1992) and during the recent POD years (Sommer et al. 2007) were both associated with hydrodynamic conditions that greatly increased delta smelt entrainment losses as indexed by numbers of fish salvaged. However, currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008).

BiOp at 210 (emphasis added). It was not unreasonable for FWS to rely on Kimmerer (2008) to conclude that salvage events may be "sporadically significant." Plaintiffs' argument that FWS misinterpreted Kimmerer (2008) is unfounded. Kimmerer (2008) explains why, despite the absence of a statistically significant correlation between export pumping and the subsequent year's smelt population (i.e., between export pumping and the population growth rate), the demonstrated "sporadically significant" loss of

smelt within year classes could significantly contribute to the species' jeopardy. FWS reasonably relied on Kimmerer (2008) for this finding.

Applying Kimmerer's estimates of entrainment and other data, the BiOp analyzed the effect Project operations have on the frequency of relatively large loss events. For larval and juvenile delta smelt:

> Kimmerer (2008) proposed a method for estimating the percentage of the larval-juvenile delta smelt population entrained at Banks and Jones each year. These estimates were based on a combination of larval distribution data from the 20-mm survey, estimates of net efficiency in this survey, estimates of larval mortality rates, estimates of spawn timing, particle tracking simulations from DWR's DSM-2 particle tracking model, and estimates of Banks and Jones salvage efficiency for larvae of various sizes. Kimmerer estimated larval-juvenile entrainment for 1995-2005. We used Kimmerer's entrainment estimates to develop multiple regression models to predict the proportion of the larval-juvenile delta smelt population entrained based on a combination of X2 and OMR....

BiOp at 220. The BiOp predicts that "the proposed action will decrease the frequency of years in which estimated entrainment is [less than or equal to] 15 percent. Thus, over a given span of years, the project as proposed will increase larval-juvenile entrainment relative to 1995-2005 levels. This will have an adverse effect on delta smelt based on their current low population levels." BiOp at 222.

For adult delta smelt:

> The median OMR flows from the CALSIM II modeled scenarios were more negative than historic OMR flow for

all WY types except critically dry years (Figure E-3; see Table E-5b for all differences). Overall, proposed OMR flows are likely to generate increases in population losses compared to historic years (Figure E-5 and Figure E-6). For example, the frequency of years when population losses are less than 10 percent from most modeled studies (except studies 7.0 and 8.0) is less than 24 percent compared to historic estimates that only exceed 10 percent in approximately half of the years.

The most pronounced differences occur during wet years, where median OMR flows are projected to be approximately 400 to 600 percent (-7100 to -3678 cfs) higher than historical wet years (-1032 cfs). Generally, wet years are marked by low salvage and population losses. However, the proposed operations during wet year are predicted to cause up to a 65 percent increase in smelt salvage and lower probability that population losses will be below 10 percent.

The proposed operation conditions likely to have the greatest impact on delta smelt are those modeled during above normal WYs. The modeled OMR flows for the above normal WYs ranged between -8155 and -6242 cfs, a 33 to 57 percent decrease from the historic median of -5178 cfs. Though the predicted salvage would only be about 15-20 percent higher than historic salvage during these years (Table E-5c), the modeled OMR flows in these years would increase population losses compared to historic years.

In below normal and dry WYs, proposed OMR flows are also modeled to decrease from historic medians. Predicted salvage levels are likely to increase between 2 and 44 percent. More importantly, the modeled median flows from all studies in these WY types range between -5747 and -7438 cfs. Modeled OMR flows at these levels are predicted to increase salvage and increase the population losses from historic levels as well.

During critically dry years, the median OMR flows for studies 7.0, 7.1, 8.0, 9.1, 9.4, and 9.5 are less than -5,000 cfs. These studies have predicted salvage lower than historic salvage and are not likely to generate larger population losses compared to historic years. The models might overestimate salvage during critical dry years when smelt are unlikely to migrate towards

> the Central Delta due to lack of turbidity or first flush. Thus, the effects of critical dry operations on delta smelt take are probably small and lower than estimated.
>
> In summary, adult entrainment is likely to be higher than it has been in the past under most operating scenarios, resulting in lower potential production of early life history stages in the spring in some years. While the largest predicted effects occur in Wet and Above Normal WYs, there are also likely adverse effects in Below Normal and Dry WYs. Only Critically Dry WYs are generally predicted to have lower entrainment than what has occurred in the recent past.

BiOp at 212-13.

This approach is consistent with Kimmerer (2008). The BiOp does not focus on whether there is a statistically significant correlation between OMR flows and the population growth rate.[10] Rather, following Kimmerer (2008), the BiOp focuses on predicting the frequency of large salvage events and concluded that Project operations increase their frequency. It was not arbitrary, capricious, or clear error for FWS to base its jeopardy conclusion in part on these predictions of relative increases in entrainment. *See* BiOp at 276.

b. Population Level Analysis/Life-Cycle Modeling.

Plaintiffs maintain the BiOp's failure to employ a life-

[10] FWS did rely on a study by Manly and Chotkowski that found a statistically significant correlation between OMR flows and smelt abundance, albeit a small one. *See* BiOp at 159 ("Manly and Chotkowski (2006; IEP 2005) found that monthly or semi-monthly measures of exports or Old and Middle rivers flow had a reliable, statistically significant effect on delta smelt abundance; however, individually they explained a small portion (no more than a few percent) of the variability in the fall abundance index of delta smelt across the entire survey area and time period.").

cycle model ignored the best available science. Doc. 551 at 21-22. Using a quantitative[11] life-cycle model[12] is a recognized (the best) method to evaluate the effects of an action upon a fish population's growth rate. Dr. Richard B. Deriso[13] opined that a population growth rate analysis is the generally accepted method utilized by fisheries biologists to evaluate the impact of a stressor on a fish species' population. Declaration of Dr. Richard B. Deriso, Doc 401, at ¶ 36; *see also* Declaration of Dr. Ray Hilborn[14], Doc. 393, at ¶¶ 7-16 (agreeing that life-cycle models are the accepted method in population dynamics to evaluate anthropogenic effects on the probability of growth or decline of a species); Declaration of Ken B. Newman[15], Doc. 484, at ¶ 8 (agreeing with "utility of life history models for assessing population level effects of SWP/CVP operations."). Dr. Hilborn explained that a quantitative population dynamics/life cycle model can help distinguish human actions that have a significant impact on population size from those that have little impact on population size, because competition for a resource that is independent of the human activity may cause significant mortality

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[11] The BiOp used a relatively simple, non-quantitative, conceptual life-cycle model. *See* BiOp at 203. It is undisputed that no quantitative life cycle model was employed.

[12] The experts use the term "population dynamics model," "life history model," and "life cycle model" interchangeably.

[13] Dr. Deriso is an expert in the field of quantitative ecology and its application to fisheries management. Deriso Decl., Doc. 396, at ¶¶ 5-10.

[14] Dr. Hilborn is an expert in aquatic and fishery sciences. Hilborn Decl., Doc. 393, at ¶ 1.

[15] Dr. Newman is an expert in mathematical statistics employed by FWS in Stockton, California.

at one stage in the species' life cycle, meaning that human actions that kill fish at that life stage may have little impact on the population level later in the life history. Hilborn Decl., Doc. 393 at ¶ 15.

Federal Defendants knew of the value of life-cycle modeling. At a March 8, 2007 meeting on the OCAP ESA Re-consultation, attended by FWS employees, the importance of using a life cycle model was emphasized and inquiry made about the progress to date. AR 016016 - 016017. During the Delta Smelt Action Evaluation Team meeting on August 8, 2008, that Team recognized that population models for delta smelt already had been developed, and that those models were a starting point for quantitative analyses when combined with appropriate assumptions. AR 011381-011382; *see also* AR 010023, 010027-010029.

There is considerable dispute over whether an appropriate life-cycle model (i.e., one sufficient to perform the types of analyses that would be helpful in the BiOp) existed at the time the BiOp issued. Dr. Newman declares:

> Despite the utility of life history models and despite the information that the various surveys provide about different life history stages, an adequately realistic quantitative delta smelt life history model that has been fit using fish survey data does not exist. The BiOp did in many places (e.g., pp 146, 184, 203) consider the full life history of delta smelt but considerations were via conceptual models in contrast to quantitative models with parameters estimated from data. Part of the difficulty is that there are currently no off-the-shelf computational programs for fitting such a model to data and one must develop

> customized, computer intensive software. The need to model the spatial and temporal changes in population abundances and to account for the different sources of uncertainty makes model formulation and fitting complex. In particular, uncertainty in survey data, due to random sampling error and bias, complicates model fitting. Capture probabilities differ between surveys, the probabilities are largely unknown (despite efforts made to estimate them, for example, for FMWT data, see Newman 2008 (Administrative Record "AR" at 19782-19799)), and capture and fish presence probabilities are thus confounded. Furthermore, given the patchiness and heterogeneity of the spatial and temporal distribution of delta smelt and the relatively low capture probabilities (whatever they might be), the sampling errors associated with survey data can be quite large (Newman 2008 (AR at 19782-19799)). Failure to account for sampling errors may result in biased parameter estimates (including wrongly concluding density dependence; Shenk et al. 1998). *The difficulties are not insurmountable, but concentrated research efforts are required*. I know of three such efforts currently underway and at varying stages of development: (1) an individual-based model with a spatial component by Drs. Wim Kimmerer, San Francisco State University, William Bennett, University of California at Davis, Stephen Monismith, Stanford University, and Kenneth Rose, Louisiana State University; (2) a population-level life history model using information from multiple surveys by Dr. Mark Maunder, Inter American Tropical Tuna Commission; (3) similar to Maunder, a life history model with a spatial component based on multiple surveys' data has been conceptually sketched by me and others in the NCEAS POD working group. Given sufficient time and appropriate technical resources, including personnel, to focus on model formulation and fitting, these models might be available within a year.

Newman Decl., Doc. 484 at ¶ 5.

All of the experts agreed with Dr. Newman that, at the time the BiOp was issued, there was no "off-the-shelf" life-cycle model to apply to delta smelt. Considerable dispute exists over how long it should have taken FWS to develop a competent model.

It is undisputed that basic life-cycle models such as the Ricker model can be applied to fisheries data sets in relatively short order. Deriso Decl., Doc. 605, at ¶ 52. Dr. Deriso opined that FWS had all the data necessary to perform a life-cycle analysis. Deriso Decl., Doc. 401, at ¶ 70. Dr. Hilborn stated that a relatively complex life-cycle model that "follow[s] the size structure of delta smelt through their life history and fit this into the observed size structure" would "require no more than a few months time to construct, evaluate and use in a biological opinion." Hilborn Decl., Doc. 600 at ¶ 14. Dr. Punt, a 706 Expert with expertise in fish population dynamics and biostatistics, *see* Doc. 394 at 2, stated "[i]t is surprising that a population dynamics model was not developed for delta smelt for the BiOp.... The model developed by Bennett could have been extended to more fully account for the biology of delta smelt and fitted to data to assess the population-level effects of impact of the project." Doc. 633-1 at 3.

Federal Defendants' expert, Mr. Feyer disagrees:

> Developing a quantitative population model is a challenging and complex exercise that could not have been completed by USFWS within the timeframe required to issue the 2008 BiOp. The work requires a substantial investment of resources and individuals with very specialized skills. The process to develop, test, peer-review, and apply such models often takes years. For instance ... the development of models for Columbia River salmon ... took no less than three years to complete.
>
> Because of the recognized urgent need for such tools,

there are on-going efforts to develop quantitative population models for delta smelt. For instance, Bennett (2005) presented preliminary results from a stage-structured model he is developing to examine tradeoffs among sources of mortality acting on different cohorts and life stages. *See* AR at 17004-74. The development of this model is part of a broader comprehensive effort by a team of researchers including Dr. Kenneth Rose of Louisiana State University, Dr. Wim Kimmerer of San Francisco State University, Dr. William Bennett of the University of California at Davis, and Dr. Stephen Monismith of Stanford University, who are in the early stages of developing, testing, and applying particle-tracking models, an individual-based model, and a matrix projection model. The development of these particular models is very promising but has also been faced with many challenges. Perhaps the most critical challenge has been a freeze on project funding by the State of California; it is uncertain if the funding will be reinstated. Another example is the work I have been personally involved with at NCEAS. The NCEAS team has used Bayesian changepoint techniques and multivariate autoregressive modeling to identify factors contributing to the decline of delta smelt and other species. The results of this work will be published in two papers in an upcoming issue of the journal Ecological Applications. I am aware of at least two other independent efforts of modeling the effects of various stressors on delta smelt that are also under development. Unfortunately, none of the work I mention above was available when the 2008 BiOp was being prepared. To my knowledge, no comprehensive quantitative population dynamics model for the delta smelt has been developed, subjected to peer-review, and published.

...[Q]uantitative population models are grounded in what is known about the biology of a species, and processes that may plausibly affect its abundance.... Although there is a substantial amount of data available on delta smelt, a key problem is that much of the sample data has increasingly contained zero values. These zeros are a reflection of declining population abundance. Such low numbers make it more difficult to acquire more recent information about the factors that drive delta smelt population dynamics, such as survival probabilities by life history stage, movement patterns and spatial distribution, and fecundity or reproductive

> success. It is thus becoming increasingly difficult to not only simply estimate such factors, but also increasingly difficult to model how these factors are affected by environmental and anthropogenic processes such as those considered in the 2008 BiOp. The estimation of delta smelt population size exemplifies this problem. Newman (2008), see AR at 19782-99, recently published a sample design-based procedure for estimating the population abundance of pre-adult and adult delta smelt. However, the resulting estimates of population size were quite imprecise. This was caused, in part, by limitations of the available data to estimating capture probabilities and gear efficiency.
>
> ... I agree ... that population dynamics models have been used to evaluate consequences of various stressors on a wide range of species and human impacts. I also agree that there is sufficient data to develop such a model for delta smelt, as demonstrated by the examples I provided above. However, although some are in development, the fact remains that no such model has been fully developed, peer-reviewed and made available for application. Thus, in the absence of such models, I disagree that that the techniques used by USFWS were inconsistent with generally-accepted scientific standards and practices. To the contrary, in the absence of such a model, and because one could not be developed during the time allowed for this consultation, the techniques used by USFWS do reflect generally-accepted scientific standards and practices.

Decl. of Frederick V. Feyrer[16], Doc. 541, at ¶¶ 30-33. Plaintiffs do not suggest any party that participated in the preparation of the OCAP Biological Assessment ("OCAP BA" or "BA") or commented on the public review drafts of the BiOp during the consultation submitted to FWS a quantitative life cycle model or the results of such an analysis using a life cycle model for delta smelt.

The ESA does not require FWS's to generate new studies. In

[16] Mr. Feyrer is a Reclamation Fish Biologist with an M.S. in biology. He has extensive experience researching and advising on fisheries management issues in the San Francisco Estuary. Feyrer Decl., Doc. 481, at ¶ 1.

Southwest Center for Biological Diversity v. Babbitt, 215 F.3d 58 (D.C. Cir. 2000), the district court found "inconclusive" the available evidence regarding FWS's decision not to list the Queen Charlotte goshawk, and held that the agency was obligated to find better data on the species' abundance. The D.C. Circuit reversed, emphasizing that, although "the district court's view has a superficial appeal ... this superficial appeal cannot circumvent the statute's clear wording: The secretary must make his decision as to whether to list a species as threatened or endangered 'solely on the basis of the best scientific and commercial data available to him....' 16 U.S.C. § 1533(b)(1)(A)." *Id.* at 61 (emphasis added); *see also American Wildlands v. Kempthorne*, 530 F.3d 991, 998 (D.C. Cir. 2008) (the "best available data" standard "requires not only that the data be attainable, but that researchers in fact have conducted the tests").

Plaintiffs advocate a narrow reading of both *Southwest Center* and *American Wildlands*, arguing these cases only mean that the agency is not required to gather new data in the field regarding a species if such information is not already available. Doc. 697 at 22. Plaintiffs object that "[n]either of these cases supports Defendants' position that FWS could disregard the smelt abundance data that were already in its possession and fail to undertake the necessary statistical analyses to satisfy its

statutory mandate to determine 'whether the action ... is likely to jeopardize the continued existence of the species.' 50 C.F.R. § 402.14(g)(4)." *Id.*

Plaintiffs cite no authority suggesting that the non-existence of an analytical model should be treated any differently from the non-existence of raw field data. FWS did not have an off-the-shelf form of "statistical analysis" it could apply to determine the effects of Project Operations on the delta smelt population. Although life-cycle modeling is standard practice in the field of fisheries biology, and a life-cycle model is being (and should have been) developed for delta smelt, it is undisputed that an appropriate life cycle model had not been developed at the time the BiOp issued. FWS must apply the best "available" science; not the best science possible. FWS's failure to apply a life cycle model did not per se violate the ESA or the APA.

It is undisputed that application of a quantitative life cycle model is the preferred scientific methodology. Based on the preponderating expert testimony, FWS had the time and ability to prepare the necessary life-cycle model. FWS made a conscious choice not to use expertise available within the agency to develop one. A court lacks authority to require completion of a life-cycle model. In light of uncontradicted expert testimony that life-cycle modeling is necessary and feasible, FWS's failure

to do so is inexplicable.

c. FWS' Use of Raw Salvage Numbers.

Plaintiffs argue that FWS's use of raw salvage numbers in its quantitative justification for the flow prescriptions in Actions 1 and 2 constitutes a failure to apply the best available science. Action 1, designed to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cubic feet per second ("cfs") on a 14-day average and no more negative than -2,500 cfs for a 5-day running average. BiOp at 280-81, 329-30. Action 2, designed to protect adult delta smelt that have migrated upstream and are residing in the Delta prior to spawning, is triggered immediately after Action 1 ends or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.

The BiOp provides a quantitative justification for these specific flow prescriptions in Attachment B, entitled "Supplemental Information related to the Reasonable and Prudent Alternative." The following subsection entitled, "Justification for Flow Prescriptions in Action 1," is critical to the present challenge and is reproduced here in its entirety:

Justification for Flow Prescriptions in Action 1

Understanding the relationship between OMR flows and delta smelt salvage allows a determination of what flows will result in salvage. The OMR-Salvage analysis herein was initiated using the relationship between December to March OMR flow and salvage provided by P. Smith and provided as Figure B-13, below. Visual review of the relationship expressed in Figure B-13 indicates what appears to be a "break" in the dataset at approximately -5,000 OMR; however, the curvilinear fit to the data suggest that the break is not real and that the slope of the curve had already begun to increase by the time that OMR flows reached -5,000 cfs.

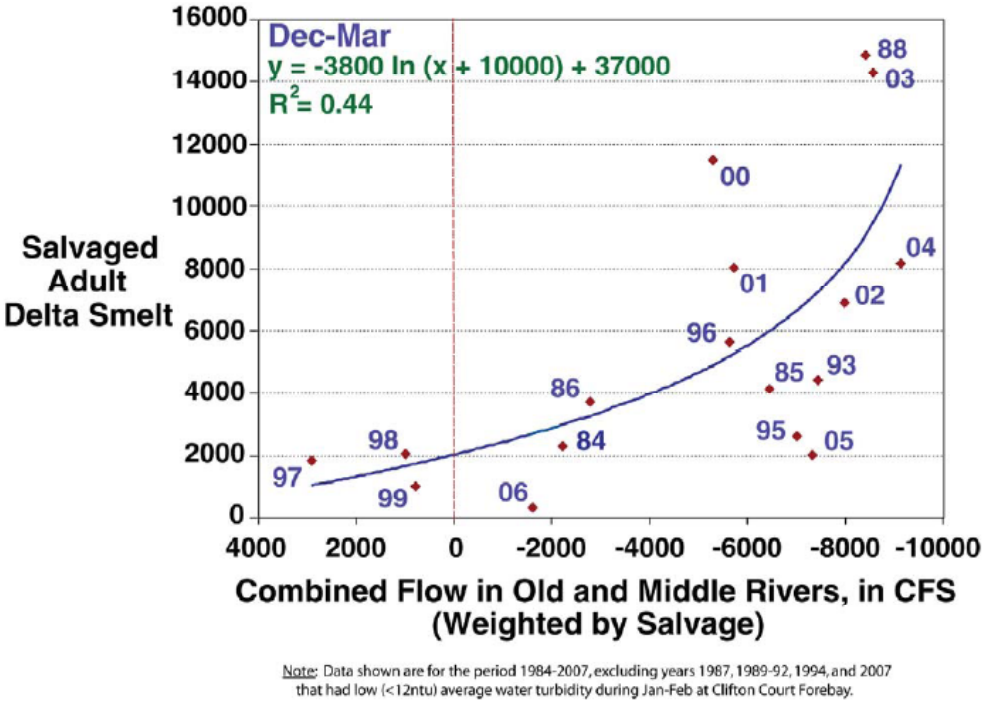

Figure B-13. OMR-Salvage relationship for adult delta smelt. (source, P. Smith). Data from this figure were the raw data used in the piecewise polynomial regression analysis.

Further, a nonlinear regression was performed on the dataset, and the resulting pseudo-R_2 value was 0.44—suggesting that although the curvilinear fit is a reasonable description of the data, other functional relationships also may be appropriate for describing the data. Fitting a different function to the data could also determine the location where salvage increased, i.e. identify the "break point" in the relationship between salvage and OMR flows. Consequently, an analysis was performed to determine if the apparent break at -5,000 cfs OMR was real. A piecewise polynomial regression, sometimes referred to as a multiphase model, was used to establish the change (break) point in the dataset.

A piecewise polynomial regression analysis with a linear-linear fit was performed using data from 1985 to 2006. The linear-linear fit was selected because it was the analysis that required the fewest parameters to be estimated relative to the amount of variation in the salvage data. Piecewise polynomial regressions were performed using Number Cruncher Statistical Systems (© Hintz, J., NCSS and PASS, Number Cruncher Statistical Systems, Kaysville UT).

The piecewise polynomial regression analysis resulted in a change point of -1162, i.e. at -1162 cfs OMR, the slope changed from 0 to positive (Figure B-14). These results indicate that there is a relatively constant amount of salvage at all flows more positive than -1162 cfs but that at flows more negative than -1162, salvage increases. The pseudo-R_2 value was 0.42, a value similar to that obtained by P. Smith in the original analysis.

To verify that there was no natural break at any other point, the analysis was performed using a linear-linear-linear fit (fitting two change points). The linear-linear-linear fit resulted in two change points, -1,500 cfs OMR and -2,930 cfs OMR. The -1,500 cfs value is again the location in the dataset at which the slope changes from 0 to positive. The pseudo-R_2 value is 0.42 indicating that this relationship is not a better description of the data. Because of the additional parameters estimated for the model, it was determined that the linear-linear-linear fit was not the best function to fit the data, and it was rejected. No formal AIC analysis was performed because of the obvious outcome.

A major assumption of this analysis is that as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant. If the number of fish in the vicinity of the pumps declined, fewer fish would be entrained and more negative OMR flows would result in lower salvage. This situation would result in an overestimate, i.e. the change point would be more positive. In fact, if the residuals are examined for the relationship in Figure B-13 above, the salvage for the POD years 2002, 2004, 2005, and 2006 are all below the line. 2003 is above the line although the line is not extended to the points at the top of the figure, and these data points occur when the curve becomes almost vertical. The negative residuals could be a result of a smaller population size available for entrainment and salvage. This could be verified by normalizing the salvage data by the estimated population size based on the FMWT data.

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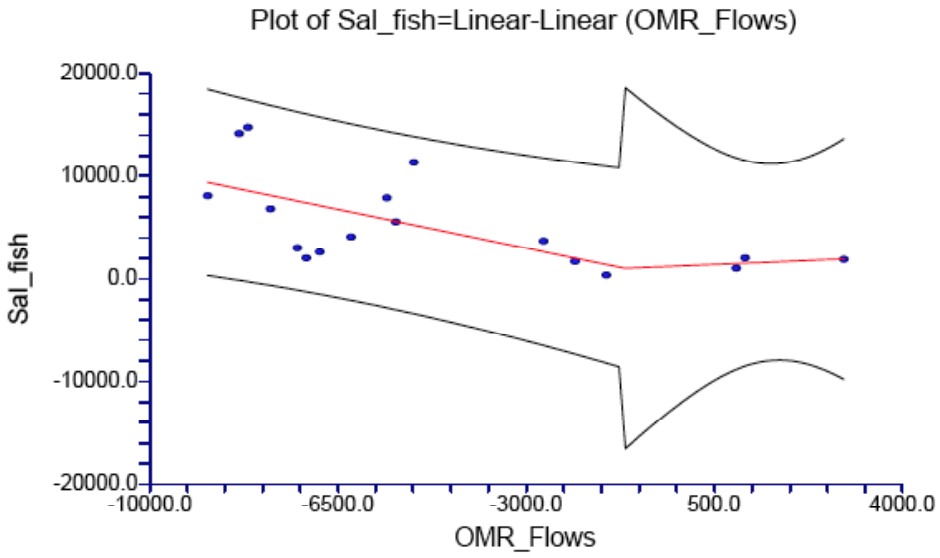

Figure B-14. Piecewise polynomial regression of OMR flows and salvage. The change point is the location at which the two regression lines meet; -1,162 cfs OMR.

The original values of OMR and salvage could have been measured with error due to a number of causes, consequently the values used in the original piecewise polynomial analysis could be slightly different than the "true" values of salvage and OMR flow. Consequently, a second analysis was undertaken to examine the effect of adding stochastic variation to the OMR and salvage values in the piecewise polynomial regression analysis. The correlation between OMR and salvage in the original dataset was -0.61 indicating that the more negative the OMR, the greater the salvage. Consequently, it was necessary to maintain the original covariance structure of the data when adding the error terms and performing the regressions. The original covariance structure of the OMR–salvage data was maintained by adding a random error term to both parameters. The random error term was added to OMR and a correlated error term was added to salvage. The expected value of the correlated errors was -0.61.

The error terms were selected from a normal distribution with a mean of 1.0 and a standard deviation of 0.25 which provided reasonable variability in the original data. Operationally this process generated a normal distribution of OMR and salvage values in which the mean of the distributions were the original data points. Additional analyses were performed with standard deviations of 0.075, 0.025, and 0.125. Smaller standard deviations in the error term resulted in estimates of the change point nearer to the original estimate of -1,162 cfs. This is to be expected as the narrower the distribution of error terms, the more likely the randomly selected values would be close to the mean of the distribution. The process was repeated one hundred times, each time a new dataset was generated and a new piecewise polynomial regression was performed. The software package @Risk (© Palisade Decision Tools) was used to perform the Monte Carlo simulations. Latin

> hypercube sampling was used to insure that the distributions of OMR and salvage values were sampled from across their full distributions. The parameter of interest in the simulations was the change point, the value of the OMR flow at which the amount of salvage began to increase. Incorporating uncertainty into the analysis moved the change point to -1,800 cfs OMR, indicating that at flows above -1683, the baseline level of salvage occurred but with flows more negative than -1683, salvage increased.

BiOp 347-51 (emphasis added).

The analyses contained in Figures B-13 and B-14 serve, *inter alia,* as justification for Action 1: setting "break points" above and below which entrainment rates noticeably change. These break points are the foundation for the tiered flow restrictions in RPA Action 1. Cay Collette Goude[17] stated in her expert declaration that the analysis conducted by Dr. Michael Johnson, set forth in Figure B-13, found inflection points where entrainment started to increase with more negative OMR flows, and that the inflection point "was -1,800 cfs OMR when uncertainty was factored into the analysis." Doc. 470, at ¶ 22. The BiOp does not explain in the "Justification for Flow Prescriptions in Action 1" or elsewhere how or why this -1,800 cfs figure relates to the -2,000 cfs upper limit imposed by Action 1.[18]

Action 2 calls for flows to be set within a range from

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[17] Ms. Goude is the Assistant Field Supervisor for the Endangered Species Program in the Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service. Goude Decl., Doc. 470, at ¶ 1.

[18] In explaining actions designed to protect juvenile smelt, Ms. Goude makes reference to another portion of Appendix B, which sets forth the justification for Action 3's restrictions to protect larval smelt. There, the BiOp states that "entrainment risk grows exponentially at OMR flows increasingly more negative than -2,000 cfs." BiOp at 381 (cited in Goude Decl. at ¶ 24). This conclusion appears to be based upon computer modeling using the Particle Tracking Method ("PTM"). The BiOp does not state that PTM modeling was used to formulate the flow prescriptions imposed by Action 1.

-5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. BiOp *at* 281-82, 352-56. Although Appendix B describes and justifies Action 2 separately from Action 1, there is no independent section justifying the flow prescriptions imposed by Action 2. Instead, there is a sub-section entitled "Justification for Guidelines in Setting Prescriptions of Action 2" which fixes biological and environmental parameters the SWG is to use in setting flows within the -5,000 cfs to -1,250 cfs range. *See* BiOp at 355. There is no independent quantitative or qualitative justification for the upper and lower limits of that range. In fact, the "Justification for Guidelines in Setting Prescriptions of Action 2" section contains the following statement:

> Flow requirements defined within Action 2 follow the same protectiveness criterion established during Action 1, as adjusted to reflect real-time conditions and predicted entrainment risk relative to the anticipated distribution and abundance of year-class delta smelt; and reflecting their behavioral propensity to hold in their chosen spawning habitat. These are allowed to vary based upon assessment of available data as described in the adaptive process described in the Introductions to Actions section above.

BiOp at 356.

Plaintiffs complain that the "Justification for Flow Prescriptions in Action 1" section does not represent the best available science because it is based upon analyses of gross (or "raw") salvage (i.e. the absolute number of fish salvaged over a given time period). The use of raw salvage data, as opposed to

salvage data scaled to population size, is problematic because raw salvage figures do not account for the size (or relative size) of the smelt population. Deriso Decl., Doc. 401, at ¶ 28. The BiOp admits as much, and concedes that the analysis assumes that "as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant." BiOp at 349. Considering raw salvage numbers alone provides no means of distinguishing an event in which 10,000 fish are salvaged out of a population of 20,000 from an event in which 10,000 fish are salvaged from a population of 20 million. Deriso Decl., Doc. 401, ¶ 28.

There is widespread agreement among the scientific experts that the use of normalized salvage data rather than gross salvage data is the standard accepted scientific methodology among professionals in the fields of fisheries biology/management. Doc. 633-1 at 7, 10 (the 706 experts concluded that, although it is not inherently unreasonable to consider the analysis in Figure B-13, it would be unreasonable to rely on that analysis as the only basis for imposing flow restrictions); Deriso Decl., Doc. 401 at ¶¶ 51-56 (FWS's reliance on Figure B-13 to conclude that as negative OMR flows increase, more adults are salvaged is "scientifically flawed because raw salvage numbers do not have a directly proportional effect on population and do not take into account the overall size of the population...."); Newman Decl.,

Doc. 484 at ¶ 11 (concurring with Dr. Deriso's "general notion of scaling salvage by some measure of population size.").

FWS was aware that raw salvage data posed this obvious problem. The BiOp itself recognized the necessity of normalizing raw salvage data:

> To provide context to determine the magnitude of effect of pre-spawning adult direct mortality through entrainment within any given season (as measured by salvage), it is necessary to consider two important factors.....¶ The second factor to consider when relating salvage to population-level significance is that the total number salvaged at the facilities does not necessarily indicate a negative impact on the overall delta smelt population.

BiOp at 338. The August 26, 2008, draft meeting notes of FWS's Delta Smelt Action Evaluation Team state:

> When analyzing the importance of entrainment to the species population structure or decline, the relevant fact to consider is the percentage of the population being removed via entrainment. Salvage data, by itself, may not be sufficient to help one understand the percentage of the population being removed via entrainment.

AR 010023. The Independent Peer Review of FWS's draft Effects Analysis for the BiOp also recommended to FWS that it "normalize[]" salvage to population size:

> The panel suggests that the use of predicted salvage of adult smelt should be normalized for population size. Total number salvaged is influenced by a variety of factors, particularly the number of fish in the population.... Expressing salvage as a normalized index may help remove some of the confounding of the temporal trends during the baseline.

AR 008818. FWS used normalized salvage data in other parts of the BiOp, including the calculation of the Incidental Take Limit, evidencing its ability to do so. *See* Deriso Decl., Doc. 401, at

¶ 55 (citing BiOp at 386).

FWS nowhere explains its decision in the BiOp to use gross salvage numbers in Figures B-13 and B-14, and does not explain why it selectively used normalized salvage data in some parts of the BiOp but not in others. *See* Doc. 633-1 at 10 (Dr. Thomas Quinn, a 706 Expert with expertise in fisheries biology, estuarine ecology, and fish migration and movement, *see* Doc. 394 at 2, stated: "it is not clear why such an adjustment [of salvage to population size] was not made for the data examined in this report."). This was arbitrary, capricious, and represents a failure to utilize the best available science in light of universal recognition that salvage data must be normalized. This significant error must be corrected on remand.

(1) Federal Defendants' Argument that the Flow Prescriptions in Actions 1 and 2 are Otherwise Justified.

Federal Defendants argue that the specific flow prescriptions in Actions 1 and 2 are supported by more than just Figures B-13 and B-14. By portraying a negative as a positive, Federal Defendants point out that nothing in the BiOp suggests Figures B-13 and B-14 are in fact being used to draw conclusions about what is happening to the delta smelt population as a whole. Doc. 660 at 32. The BiOp concedes that "when relating salvage data to population-level significance [ ] the total number salvaged at the facilities does not necessarily indicate a

negative impact upon the overall delta smelt population." BiOp at 338. Instead, Federal Defendants suggest that the raw salvage numbers are used in "tandem" with other population-based analyses. Other sections of the BiOp demonstrate that salvage by the Project pumping facilities can have a "sporadically significant" effect on the delta smelt population.

However, Federal Defendants concede that neither the research supporting the "sporadically significant" finding nor any related discussion in the BiOp generate the kind of "operational metric... needed so that Project pumping can be managed to prevent the entrainment numbers that these other population analyses deem necessary for avoiding population level effects." Doc. 660 at 32-33. Federal Defendants argue that the raw salvage analyses contained in Figures B-13 and B-14 are used solely to generate these "operational metrics":

> That is where raw salvage comes in – it works in tandem with these other population-based analyses, which Plaintiffs disregard. Specifically, Figures B-13 and B-14 are included to illustrate that the Projects quickly lose the ability to manage entrainment and salvage risk once OMR flows become more negative than -5000 cfs. This is the level at which it is believed that entrainment losses or the take level can be effectively managed. *See* BiOp at 366 (explaining that the function of the OMR flow targets is to manage entrainment risk).

Id. at 33. This argument does absolutely nothing to overcome the fact that the use of raw salvage in the analyses depicted in figures B-13 and B-14 is scientifically unacceptable. Those

figures cannot accurately depict when the Projects "lose the ability to manage entrainment and salvage risk," because they do not scale salvage to population size. These figures do not take into account the possibility that one data point used to generate the curves depicted may have been collected in a year when the delta smelt population was 1,000,000, making it more likely that larger numbers of smelt would be present near the pumps to be salvaged, while another data point might have been collected during a year in which the population was 10,000, making it inherently less likely that large numbers of smelt would be found in salvage. The present record suggests that such metrics are meaningless as management tools. They cannot be used to set specific flow prescriptions. FWS was offered the opportunity to, but has not justified its approach.

At the same time, Federal Defendants contend that at least some of the "break points" reflected in the specific flow prescriptions of Components 1 and 2 are based on information unrelated to Figures B-13 and B-14. For example, in the justification for Action 3, which is designed to protect larval & juvenile smelt, the BiOp relies upon Particle Tracking Model ("PTM") results to explore the likelihood of entrainment of particles in the south Delta (used to represent that portion of the smelt population located in the south Delta) that would likely be entrained at various levels of negative OMR flow. This

is referenced as "entrainment risk":

> The most efficient protective measure for protecting the resilience and not precluding the recovery of the delta smelt population specific to the larval/juvenile lifestage is to prevent entrainment of fish in as large a portion of the Central Delta as is practical. Results of PTM modeling focusing on protections at station 815 (Prisoner's Point) indicates that precluding entrainment of larval/juvenile delta smelt at this station would also protect fish at station 812 (Fisherman's Cut) and other stations north and west (downstream) of station 815. While the target entrainment at station 815 would ideally also be zero, there appears to be little additional entrainment protection (less than 5 percent) at OMR flows at -750 cfs (the strictest level addressed by Interim Remedies). However, entrainment risk grows exponentially at OMR flows increasingly more negative than -2000 cfs.
>
> Figure B-16 displays injection points for modeled particle tracking runs that were conducted in February 2008 with injection points at Stations 711, 809, 812, 815, 902, 915. This figure plots projected relationships for OMR flows by injection point, including entrainment probabilities for station 815 (over 30 days).
>
> The results from these runs indicate an approximate <5 percent entrainment risk at OMR flow not more negative than -2000 cfs. At a requirement of -3,500 cfs OMR flow, entrainment risk at station 815 is roughly 20 percent over each 30 day interval. Assuming cumulative entrainment is additive, over a roughly four month (~120 days) interval in which Action 3 would be under effect, consistently operating at -3,500 OMR would yield a net entrainment probability placing at risk approximately 80 percent of the larval/juvenile subpopulation utilizing the South Delta at and below Station 815. If immigration of larval smelt from the Central or North Delta into the zone of entrainment during spring were to occur, the population-level risk would be even greater. Such entrainment levels are potentially a significant adverse risk to delta smelt population.

BiOp at 366-68.

Although it seems logical that the PTM results and the "entrainment risk" PTM attempts to estimate have some applicability to the protection of adult smelt, the BiOp does not

rely upon these results to justify Actions 1 or 2. ***NWF v. NMFS II***, 524 F.3d at 932, n.10 (a court "may not consider [a] post hoc justification, or infer 'an analysis that is not shown in the record.'")(quoting Gifford Pinchot Task Force, 378 F.3d at 1074, and citing ***PCFFA v. U.S. Bureau of Reclamation,*** 426 F.3d 1082, 1091 (9th Cir. 2005) ("[W]e cannot infer an agency's reasoning from mere silence," and "an agency's action must be upheld, if at all, on the basis articulated by the agency.")).

Federal Defendants also point out that Action 1 is based on "the historical observation that the first 'winter flush' moves delta smelt into portions of the delta where they are particularly vulnerable to entrainment, for biological and hydrological reasons that are well documented." Doc. 660 at 23 (citing BiOp at 333-36). Federal Defendants argue:

> As the multiple sources of information relied upon by the BiOp on this point demonstrate, pumping reductions during these critical vulnerability periods will demonstrably reduce entrainment and entrainment risk. *See id*. According to the BiOp, the piece-wise regression set forth in Figure B-14 of the BiOp was used to provide some indication of what level of exports would reduce entrainment during these first flush events, and not, as Plaintiffs assert, to analyze the impacts of salvage relative to the population. *See* BiOp at 350.

Doc. 660 at 23. The BiOp arguably supports the assertion that a "winter flush" can move smelt into areas of the delta where they are particularly vulnerable. *See* BiOp at 331. However, nothing in the discussion of the timing, characteristics, or indicators of the winter flush explains why -5,000 cfs was set as the

ceiling on negative OMR flows, rather than some other figure. That justification appears to come exclusively from Figures B-13 and B-14, which rely upon the flawed analyses of raw salvage.

Finally, Federal Defendants attempt to justify the use of raw salvage numbers in calculating the -5,000 cfs ceiling by a convoluted argument that Kimmerer's work proves raw salvage trends generally follow population trends. Kimmerer's work did evaluate the population-level effects of project operations. The BiOp explains:

> This effects analysis evaluates the proposed action operations by exploring long-term trends in Delta outflow, or X2, and OMR flows during March-June and comparing these to hydrodynamic conditions expected based on CALSIM II modeling presented in the biological assessment. The analysis uses the larval-juvenile entrainment estimates provided by Kimmerer (2008) and flow and export projections from the biological assessment to estimate the annual percentages of the larval/juvenile delta smelt population expected to be entrained....
>
> Kimmerer (2008) proposed a method for estimating the percentage of the larval-juvenile delta smelt population entrained at Banks and Jones each year. These estimates were based on a combination of larval distribution data from the 20-mm survey, estimates of net efficiency in this survey, estimates of larval mortality rates, estimates of spawn timing, particle tracking simulations from DWR's DSM-2 particle tracking model, and estimates of Banks and Jones salvage efficiency for larvae of various sizes. Kimmerer estimated larval-juvenile entrainment for 1995-2005. We used Kimmerer's entrainment estimates to develop multiple regression models to predict the proportion of the larval/juvenile delta smelt population entrained based on a combination of X2 and OMR.

BiOp at 219-220 (emphasis added). The BiOp used a similar approach for adult delta smelt:

> Kimmerer (2008) calculated that entrainment losses of adult delta smelt in the winter removed 1 to 50 percent

> of the estimated population and were proportional to OMR flow, though the high entrainment case might overstate actual entrainment. Given there are demonstrated relationships between smelt entrainment and salvage with OMR flows (Kimmerer 2008; Grimaldo et al. accepted manuscript), this effects analysis evaluates the proposed action operations by comparing the long-term trends in OMR flows to OMR flows in the CALSIM II modeling presented in the biological assessment. For both approaches, predictions of salvage and total entrainment losses were made using OMR flow since it was the best explanatory variable of each. The effects of proposed operations were determined by comparing actual salvage and entrainment losses with predictions of these parameters under modeled OMR flows.

BiOp at 211 (emphasis added). Kimmerer did calculate proportional population-level losses for both adults and juveniles. *See id.*; *see also* BiOp at 212, 250-252, 262 (presenting model simulation results in Figures E4-E6 and E16 which estimate proportional population losses based on entrainment). It is undisputed, however, that Kimmerer did not generate any operational metrics or attempt to calculate the point above or below which OMR flows would have particular effects on the smelt population. As a result, there was no basis to rely on Kimmerer's work alone to justify the specific OMR flows imposed by Actions 1 and 2. Federal Defendants point to a section of the BiOp's Effect's Analysis that concludes that because "over a given span of years, the project as proposed will increase larval/juvenile entrainment relative to 1995-2005 levels," "[t]his will have an adverse effect on delta smelt based on their current low population levels." BiOp at 222. However, this conclusion references Figure E-18, which attempts to

estimate the likelihood of having an event that would entrain a significant proportion of the smelt population, thereby evaluating the effect of particular circumstances on the smelt population. *See* BiOp at 264. This language provides no support for Federal Defendants' assertion that the BiOp connects population level effects to raw salvage figures.

Federal Defendants assert "Kimmerer (2008), like the BiOp, concluded that once raw entrainment numbers approach a certain level, population-level effects will occur." Doc. 660 at 25 (citing BiOp at 159, 164-65, 210; AR at 18854-18880). Federal Defendants describe this as the "Kimmerer Approach," and argue:

> The Kimmerer (2008) study shows that salvage trends generally follow population loss trends. *See* BiOp at 206-207; *see also* AR at 18854-18880. Salvage data is then used to ascertain the pumping level at which entrainment risk can no longer be managed to a level that prevents harm to the population as a whole. See BiOp at 338. Using the Kimmerer approach, by managing salvage, the BiOp manages population-level losses.

Doc. 660 at 25. This description is not supported by the record. The BiOp does not rely upon Kimmerer (2008) or any other source to conclude that salvage trends generally follow population loss trends. This is FWS's invention to support its arbitrary flow limit.

FWS nowhere explains in the BiOp or the AR how the sporadically significant population-level effects identified in Kimmerer (2008) factored into the quantitative analysis that led to the -5,000 cfs OMR flow limit imposed in RPA Action 2.

Nowhere does the BiOp or the record explain how the analysis in Fig. B-13 "works in tandem" with the purported numeric results of Kimmerer (2008), and nowhere does the BiOp or the record state that Fig. B-13 was intended to create an "operational metric" to manage pumping to avoid "certain raw entrainment numbers." This is an abdication of the duty to satisfy the basic APA requirement that the agency "articulate[] a rational connection between the facts found and the choice made." *Ariz. Cattle Growers' Ass'n,* 273 F.3d at 1236.

Federal Defendants argue that, even if FWS had used a scaled salvage index to calculate the OMR flow ceiling, the results would not have been appreciably different. For the purposes of demonstrating the difference between the analysis presented in the BiOp and a population-normalized analysis, Dr. Deriso analyzed the relationship between normalized salvage and OMR flows. He initially concluded that there is "no statistically significant relationship between OMR flows and adult salvage for flows less negative than -6,100 [cfs] at the very least." Deriso Decl., Doc. 401 at ¶¶ 62-65.[19] Federal Defendants' expert criticized Dr. Deriso's alternative analysis in a number of ways, including that Dr. Deriso failed to correct for potentially large

[19] Dr Deriso testified: "specifying that the ceiling on [OMR] flows should have been set at no lower than negative 6100 cfs" was stricken as post hoc extra record evidence. However, no party moved to strike Dr. Newman's similar, post hoc analysis. Dr. Deriso's analysis is considered here only as a counterpoint to Dr. Newman's, not to prove the validity of -6,100 as the appropriate ceiling.

sampling errors. Newman Decl., Doc. 484, at ¶ 12. Dr. Newman ran his own analysis, applying a different standard statistical methodology to the same data used by Dr. Deriso, and got different results regarding the "inflection point" where OMR flows had an increasing impact on the population-normalized salvage rate. *Id.* & Ex. C (identifying inflection point at -4,000 cfs, which is within the OMR flow target ranges established in the BiOp). Ultimately, however, Dr. Newman agreed that an analysis utilizing raw salvage numbers (i.e., not adjusted for relative population size) is scientifically inappropriate. *Id.* at ¶ 11. That other researchers were able to produce generally consistent inflection points through the use of more appropriate statistical methodologies does not excuse FWS's failure to do so. The difference between a -6,100 cfs ceiling and a -4,000 cfs ceiling is very substantial in the amount of lost annual water supply, with resulting adverse effects on human welfare and the human environment. FWS was required to perform an accurate scientific analysis and justify its ultimate decision regarding the imposition of a water flow ceiling.[20]

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[20] Federal Defendants point out that the BiOp also relied on the 2006 Manly and Chotkowski study, which found a statistically significant relationship between exports and smelt abundance as measured by Fall Midwater Trawl ("FMWT") catches, *see* AR 019672 (cited in BiOp at 156), as well as the Interagency Ecological Program's 2007 Synthesis Report on the Pelagic Organism Decline Team, which stated that "... entrainment of adults and larvae (top-down effects) are particularly important to the delta smelt population...." AR 016922 (emphasis added); *see also* Goude Decl., Doc. 470, at ¶¶ 6-7. However, none of these studies correlate raw salvage to population-level losses, nor do they otherwise justify the imposition of the particular flow

(2) Use of Raw Salvage Analyses in Justification for Action 3.

Action 3, which is designed to "[m]inimize the number of larval delta smelt entrained at the facilities by managing the hydrodynamics in the Central Delta...," limits net daily OMR flow to no more negative than -1,250 to -5,000 cfs, based on a 14-day running average with a simultaneous 5-day running average within 25 percent of the applicable requirement for OMR. BiOp at 357. Action 3 establishes guidelines the SWG is to use when recommending where to set the OMR flow level within this range. *Id*. The BiOp anticipates that during most conditions, OMR flows will range between -2,000 and -3,500 cfs. *Id*. at n. 10. During certain years of higher or lower predicted "entrainment risk," flows as low as -1,250 or as high as -5,000 may be recommended. *Id*.

Plaintiffs do not challenge the basis for the low end of the range (-1,250 cfs) or the criteria used to formulate recommendations within the middle of the range. Plaintiffs do argue that the upper end of the range (-5,000 cfs) is based solely on FWS's raw salvage analysis and should be invalidated.

The BiOp explains in the section of Attachment B addressing Action 3 that "[t]wo scenarios span the range of circumstances likely to exist during Action 3":

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regime the BiOp imposes.

> **First, *the* low-entrainment risk scenario. There may be a low risk of larval/juvenile entrainment because there has been no evidence of delta smelt in the South and Central Delta or larval delta smelt are not yet susceptible to entrainment. *In this scenario, negative OMR flow rates as high as -5,000 cfs may occur as long as entrainment risk factors permit*.**
>
> **The second scenario, the high-entrainment risk *scenario*, is one in which either (a) there is evidence of delta smelt in the South and Central Delta from the SKT and/or 20mm survey, or (b) there is evidence of ongoing entrainment, regardless of other risk factors. In this case, OMR should be set to reduce entrainment and/or the risk of entrainment as the totality of circumstances warrant.**
>
> **Usually, if the available distributional information suggests that most delta smelt are in the North or North/Central Delta, then OMR flow can be chosen to minimize Central Delta entrainment. However, if the distributional information suggests there are delta smelt in the Central or South Delta, then OMR flows will have to be set lower to reduce entrainment of these fish. If delta smelt abundance is low, distribution cannot be reliably inferred. Therefore, the adaptive process is extremely important. The SWG may recommend any specific OMR flow within the specified range above.**

BiOp at 358 (underlined emphasis in original; emphasis in italics added). The Action 3 discussion does not provide an independent justification for the choice of -5,000 cfs as the upper limit for OMR flows under the low entrainment risk scenario. Federal Defendants suggest that the upper limit is justified in the Delta Smelt OCAP Team's notes, which indicate that "[a]t -5,000 OMR, the model shows 40% entrainment at station 815." AR 009459. This is a reference to the PTM model results. There are two major problems with Federal Defendants' reliance on this

statement. First, it is contained within a section of the Delta Smelt OCAP Team notes entitled "Actions 1 and 2." AR 009457-60. Even if this statement was made in reference to Action 3, it does not justify using -5,000 cfs as the upper limit. The PTM study assumed an upper limit of -5,000 cfs and never considered any flow ranges above that. Nor is it made clear why 40% particle entrainment is a rational threshold of significance, as opposed to some lower or higher threshold. In sum, the PTM study does not justify the imposition of -5,000 cfs as an upper limit in Actions 1, 2, or 3.

The "Action #3" section of the Team's notes does contain an explanatory statement regarding the source of the -5,000 cfs upper boundary for Action 3: "The -5,000 OMR cap was established by Wanger." AR 009463; *see also* AR 009462 ("[t]he group discussed the merits of using the -5,000 OMR per Wanger Order"). It is unclear how FWS can rely directly on a provisional court order, entered as a remedial stopgap measure pending comprehensive scientific analysis, to establish the scientific basis for an RPA. The subject Order was the result of an Interim Remedies proceeding in the challenge to the previous Delta Smelt BiOp. After an evidentiary hearing, it was determined from the then available data that "the number of Delta smelt entrained at the CVP and SWP export facilities begins to rise significantly when negative flows on the OMR exceed approximately -5,000 cfs.

[Tr. 641:14-642:5; 725:16-17; DWR Ex. D ¶ 4; DWR Ex. G ¶ 34; SWC Ex. N]." *NRDC v. Kempthorne*, 1:05-cv-1207, Doc. 561, Int. Rem. Findings, at ¶ 38. The finding was based on two studies of the relationship between OMR flows and smelt salvage: (1) a non-linear model presented by Sheila Greene of DWR; and (2) the linear model created by Peter Smith, which became the basis for Figure B-13. Both of these analyses utilized raw salvage data. AR 009251 (Green's analysis); *see also* 1:05-cv-1207, Doc. 399, Decl. of Jerry Johns, Ex. B and C; 1:05-cv-1207, Doc. 419, Decl. of Christina Swanson, at 12, Fig. 8. That raw salvage studies were previously relied upon by the Court, when no others were available, does not validate their use in the 2008 Smelt BiOp.

d. <u>FWS's Comparison of CALSIM II Data to DAYFLOW Data.</u>

The BiOp's effects analysis used analytical methods and data, "including the CALSIM II model outputs provided in the appendices of Reclamation's 2008 OCAP BA, historical hydrologic data provided in the DAYFLOW database, statistical summaries derived from 936 unique 90-day particle tracking simulations published by Kimmerer and Nobriga (2008), and statistical summaries and derivative analyses of hydrodynamic and fisheries data published by Feyrer et al. (2007), Kimmerer (2008), and Grimaldo et al. (accepted manuscript)." BiOp at 204.

CalSim II is a computer model developed jointly by DWR and

Reclamation. Declaration of Aaron Miller,[21] Doc. 548-1, at ¶ 5. The model simulates SWP and CVP operations and is the standard planning tool for evaluating project operations. *Id.* at ¶ 6. CalSim II has been continuously updated since it was first applied in 2002. *Id.* at ¶ 8. CalSim II simulates SWP and CVP reservoir operations, project exports and water deliveries, flow through the Delta, and salinity requirements in the Delta, including the location of X2. *Id.* at ¶ 7.

CalSim II uses historic hydrologic data from October 1922 to September 2003, including precipitation, runoff into reservoirs and inflow into the Delta from unimpaired streams. Miller Decl., Doc. 548-1, at ¶ 10 & n.1. The model further assumes a level of development, which reflects water demand resulting from particular levels of urban population, agricultural production, and wildlife refuge needs, *id.* at ¶ 10, along with the effect of environmental regulations and programs, *id.* at ¶ 27; BiOp at 207. CalSim II is capable of estimating the position of X2. Miller Decl., Doc. 548-1, at ¶ 14.

The BiOp considered a number of CalSim II studies, either directly or indirectly:

- Study 6.0 was designed to represent the assumptions used in the 2004 OCAP BA within the updated CalSim II model

[21] Mr. Miller is DWR's Technical Senior Water Resource Engineer and possesses expertise in CALSIM II and Dayflow modeling. Miller Decl., Doc. 548-1, at ¶¶ 1-3.

framework in order to highlight changes from the previous model framework. This Study models a 2005 level of development and includes steps to account for operations under CVPIA (b)(2) and Joint Point of Diversion[22]. *See* OCAP BA at 9-32 (AR 010729).

- Study 6.1 is similar to 6.0, except that the 2005 Trinty River Record of Decision is removed, and the Joint Point of Diversion is not accounted for. *Id.*
- Study 7.0 was developed as the baseline study for the OCAP BA. Study 7.0 represents existing conditions, and assumes a 2005 level of development and a full environmental water account ("EWA")[23]. BiOp at 207.
- Study 7.1 is a near-future conditions study. It assumes a 2005 level of development and a limited EWA. BiOp at 207-08.
- Study 8.0 is a future conditions study. It assumes a 2030 level of development and a limited EWA. BiOp at 208.

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[22] State Water Resources Control Board Decision 1641 granted Reclamation and DWR the ability to "use/exchange each Project's diversion capacity capabilities to enhance the beneficial uses of both parties...." with certain conditions. BiOp at 26.

[23] The EWA was originally designed to compensate CVP and SWP contractors for loss of water to facilitate reduced diversions from the Delta at times when at risk fish species may be harmed. BiOp at 34. "Typically the EWA replaced water loss due to curtailment of pumping by purchase of surface or groundwater supplies from willing sellers and by taking advantage of regulatory flexibility and certain operational assets." *Id.* However, at the time the BiOp was issued, the agencies that manage the EWA were undertaking environmental review to determine the future of the EWA. *Id.* As a result, the BiOp treats EWA as a "limited" asset in some circumstances. *Id.*

- **The 9.0 series of studies represents climate change scenarios. BiOp at 208.**

The OCAP BA suggested using Calsim II Study 7.0 as the current baseline and Study 6.1 as the historical baseline for evaluating the impacts of project operations. BiOp at 204. However, the BiOp rejected this suggestion because, although "changes were expected between Study 6.1 and Studies 7.0 and 7.1," the modeled results were "nearly identical." *Id.* FWS concluded from this result that Calsim II could not accurately generate an empirical baseline. *See id.* at 204-06. Instead, FWS chose to "use actual data to develop an empirical baseline," including the use of the Dayflow model to "develop[] historical time series data for hydrologic variables." BiOp at 206. Dayflow is a model that estimates historic outflow based on historic precipitation, inflow, and exports, and estimates of delta island diversions. Dayflow also provides an estimate for the location of X2. Miller Decl., Doc. 548-1, at ¶¶ 14-15.

In the BiOp, FWS purports to quantify adult entrainment by comparing OMR flows from CalSim II studies to historic OMR flows during 1967-2007. BiOp at 212-13. The BiOp depicts these results in Tables E-5a, E-5b, and E-5c:

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Table E-5a. Historic and CALSIM II modeled median winter (Dec-Mar) OMR flows by water year type

Water year type	Historic	7	7.1	8	9	9.1	9.2	9.3	9.4	9.5
Wet	-1033	-5256	-5498	-5699	-5684	-5500	-3999	-3678	-7066	-6100
Above Normal	-5178	-7209	-7923	-8073	-8156	-7595	-6863	-6934	-7861	-7723
Below Normal	-2405	-6461	-7208	-7009	-6599	-6420	-5647	-6736	-6721	-6343
Dry	-5509	-6443	-6931	-6692	-6620	-6353	-6831	-7438	-5785	-5760
Critical	-5037	-4547	-4931	-4980	-5051	-4588	-5320	-5194	-4260	-3845

Table E-5b. Winter OMR Flow percent difference from historic median value to CALSIM II model median value

Water year type	7	7.1	8	9	9.1	9.2	9.3	9.4	9.5
Wet	408.92%	432.37%	451.84%	450.36%	432.50%	287.16%	256.13%	584.15%	490.63%
Above Normal	39.21%	53.01%	55.90%	57.49%	46.67%	32.53%	33.91%	51.80%	49.13%
Below Normal	168.62%	199.68%	191.41%	174.35%	166.90%	134.75%	180.05%	179.42%	163.72%
Dry	16.95%	25.81%	21.48%	20.17%	15.32%	24.01%	35.02%	5.01%	4.57%
Critical	-9.74%	-2.12%	-1.14%	0.27%	-8.92%	5.61%	3.11%	-15.44%	-23.68%

Table E-5c. Percent difference from historic median salvage to predicted salvage based on Dec-Mar OMR flows from CALSIM II studies

Water year type	Study 7	Study 7.1	Study 8	Study 9	Study 9.1	Study 9.2	Study 9.3	Study 9.4	Study 9.5
Wet	45.64%	48.26%	50.43%	50.26%	48.27%	32.05%	28.59%	65.20%	54.76%
Above Normal	15.15%	20.49%	21.60%	22.22%	18.04%	12.57%	13.10%	20.02%	18.99%
Below Normal	38.17%	45.20%	43.33%	39.46%	37.78%	30.50%	40.76%	40.61%	37.06%
Dry	6.80%	10.36%	8.62%	8.09%	6.15%	9.63%	14.05%	2.01%	1.83%
Critical	-3.70%	-0.81%	-0.43%	0.10%	-3.39%	2.13%	1.18%	-5.87%	-9.00%

Tables E-5b and E-5c depict changes in OMR flows and entrainment using the Dayflow-generated historic data as the baseline and comparing that to CalSim II study results. In addition, the BiOp utilized an equation taken from Kimmerer's 2008 paper to estimate the population loss of delta smelt under the various modeled scenarios. The results of these calculations were depicted in Figures E-5 and E-6:

Figure E-5. Frequency distribution of predicted adult delta smelt entrained at Banks and Jones for predicted estimates from historic data (1967-1994), actual estimates from Kimmerer (2008) for years 1995-2006, and those estimated from CALSIM II model data by study.

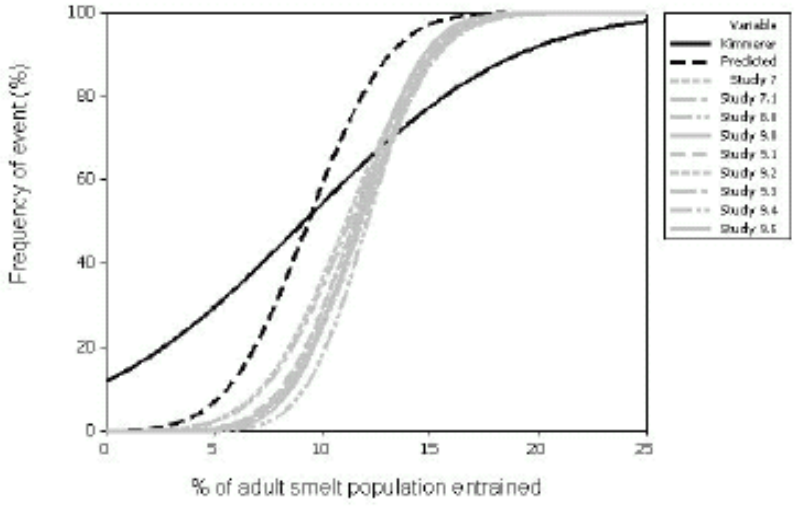

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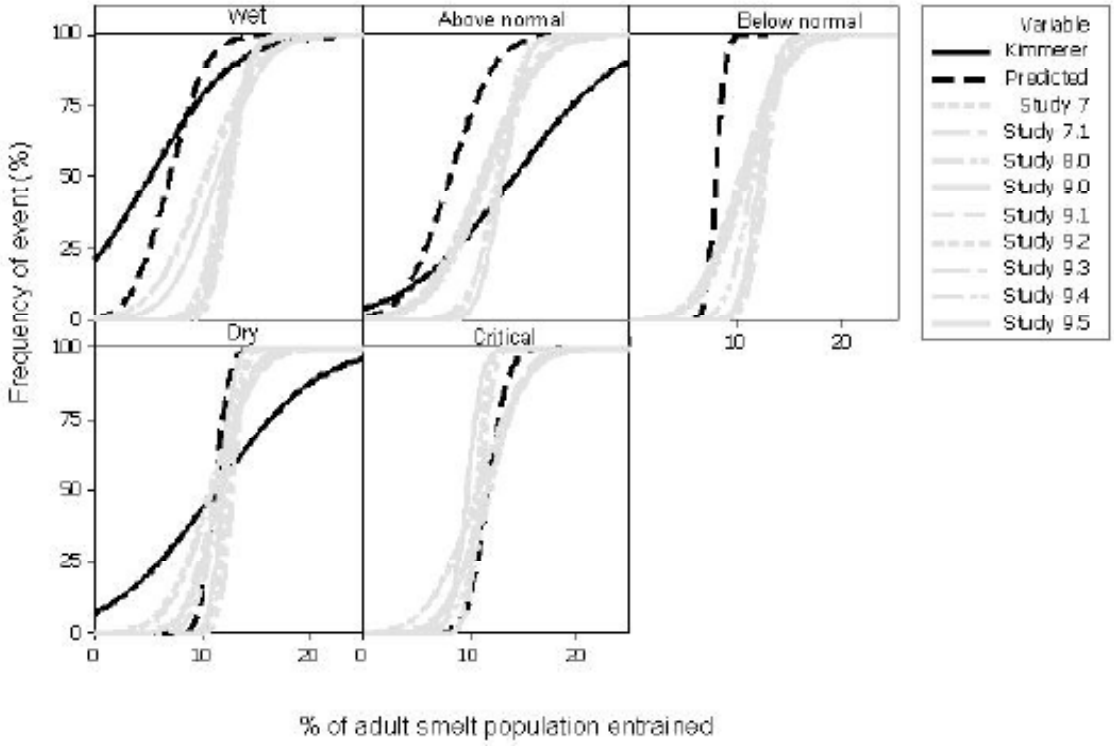
Figure E-6. Same as E-5 but by water year type. Kimmerer (2008) estimates did not include below normal or critical dry water year types.



BiOp at 251-52. The accompanying text explains the significance of these results to the analysis:

> **The median OMR flows from the CALSIM II modeled scenarios were more negative than historic OMR flow for all WY types except critically dry years (Figure E-3; see Table E-5b for all differences). Overall, proposed OMR flows are likely to generate increases in population losses compared to historic years (Figure E-5 and Figure E-6). For example, the frequency of years when population losses are less than 10 percent from most modeled studies (except studies 7.0 and 8.0) is less than 24 percent compared to historic estimates that only exceed 10 percent in approximately half of the years.**
>
> **The most pronounced differences occur during wet years, where median OMR flows are projected to be approximately 400 to 600 percent (-7100 to -3678 cfs)**

> higher than historical wet years (-1032 cfs). Generally, wet years are marked by low salvage and population losses. However, the proposed operations during wet year are predicted to cause up to a 65 percent increase in smelt salvage and lower probability that population losses will be below 10 percent.
>
> The proposed operation conditions likely to have the greatest impact on delta smelt are those modeled during above normal WYs. The modeled OMR flows for the above normal WYs ranged between -8155 and -6242 cfs, a 33 to 57 percent decrease from the historic median of -5178 cfs. Though the predicted salvage would only be about 15-20 percent higher than historic salvage during these years (Table E-5c), the modeled OMR flows in these years would increase population losses compared to historic years.
>
> In below normal and dry WYs, proposed OMR flows are also modeled to decrease from historic medians. Predicted salvage levels are likely to increase between 2 and 44 percent. More importantly, the modeled median flows from all studies in these WY types range between -5747 and -7438 cfs. Modeled OMR flows at these levels are predicted to increase salvage and increase the population losses from historic levels as well.
>
> During critically dry years, the median OMR flows for studies 7.0, 7.1, 8.0, 9.1, 9.4, and 9.5 are less than -5,000 cfs. These studies have predicted salvage lower than historic salvage and are not likely to generate larger population losses compared to historic years. The models might overestimate salvage during critical dry years when smelt are unlikely to migrate towards the Central Delta due to lack of turbidity or first flush. Thus, the effects of critical dry operations on delta smelt take are probably small and lower than estimated.

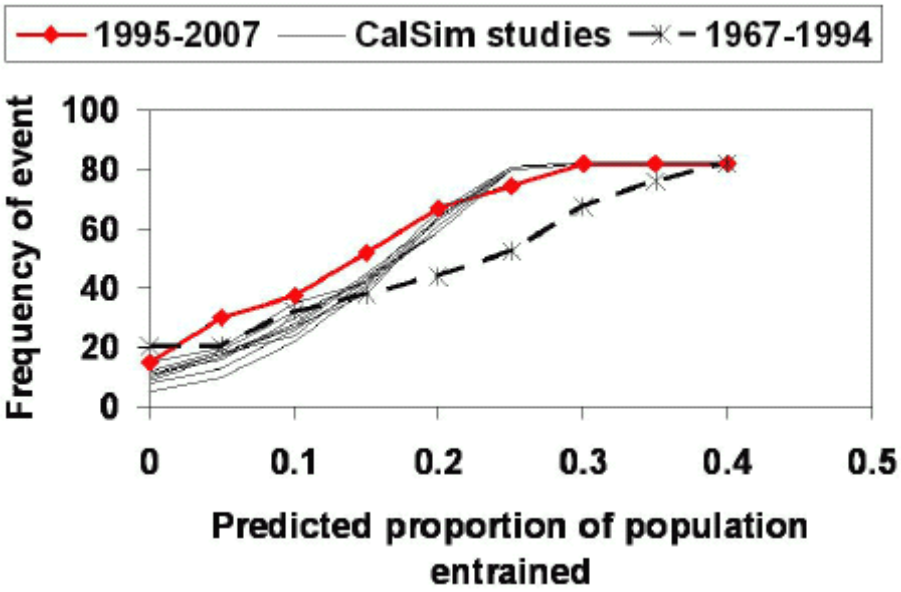
BiOp at 212-13.

Based on these comparisons of CalSim II data and Dayflow-generated historic data, the BiOp concludes, "adult entrainment is likely to be higher than it has been in the past under most operating scenarios, resulting in lower potential production of

early life history stages in the spring in some years." BiOp at 213.

The BiOp performed comparisons of CalSim II data to Dayflow-simulated historic baseline data to quantify the effects of the action on larval and juvenile delta smelt. *See, e.g.*, BiOp at 219 (examining effect of action on larval and juvenile entrainment: "[t]he analysis is based on comparison of historical (1967-2007) OMR and X2 to the proposed action's predictions of these variables provided in ... [CalSim] studies 7.0, 7.1, 8.0, and 9.0-9.5"). Figure E-18 depicts several sets of calculations of the frequency at which certain percentages of the delta smelt population would be entrained:

Figure E-17. Frequency distribution of estimated proportions of larval-juvenile de
smelt entrained at Banks and Jones for 1967-1994 and 1995-2007. The data were
extrapolated to an 82-year period to make them comparable to the CALSIM II out



BiOp at 264. The black dashed line depicts entrainment estimates for Dayflow-generated historic data from 1967 to 1994, the red

line with diamonds depicts entrainment estimates for Dayflow-generated historic data from 1995-2007, and the fine lines depict the various entrainment estimates based on Calsim II data. Based on these calculations, the BiOp concludes that "the proposed action will decrease the frequency of years in which estimated entrainment is ≤ 15 percent. Thus, over a given span of years, the project as proposed will increase larval juvenile entrainment relative to 1995-2005 levels. This will have an adverse effect on delta smelt based on their current low population levels." BiOp at 222.

A separate BiOp analysis purports to quantify the effects of the project operations on delta smelt habitat by comparing CalSim II model projections of the location of X2 under the proposed operations to the median location of X2 over the historical period 1967-2007, as simulated by Dayflow. BiOp at 235-36. Based on this comparison, the BiOp concludes "[t]he median X2 [locations] across the CalSim II modeled scenarios were 10-15 percent further upstream than actual historic X2 (Figure E-19)." *Id.* at 235. In reliance on these percent differences between CalSim II-created data and historical data, the BiOp concludes: "proposed action operations are likely to negatively affect the abundance of delta smelt." *Id.* at 236.

According to Plaintiffs, the comparison of Calsim II to Dayflow outputs distorts the BiOp in several key ways:

(1) The comparison of outputs of these two models in the Project Effects analysis is, *ipso facto*, a violation of the best available science requirement.

(2) To use Dayflow, which represents historical conditions, to generate the baseline for the Project Effects analysis, improperly attributes past effects to the Projects;

(3) Because the flawed comparison was used to support imposition of Component 3 (Action 4) (a/k/a the "fall X2" action), that Action is invalid.[24]

(1) Was FWS's Decision to Compare Calsim II to Dayflow Model Runs a Violation of the Best Available Science Requirement?

Mr. Aaron Miller opines that outputs from a CalSim II study should not be compared to outputs from the Dayflow model because the assumptions used in the two models are significantly different. Miller Decl., Doc. 548-1, at ¶¶ 22-55. He identified the following key differences between the models:

- **Level of Development: The CalSim II model assumes a constant level of development. In contrast, the Dayflow model incorporates a continuous change in the**

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[24] In some of the briefs, this third argument is presented with Plaintiffs' other challenges to the Fall X2 action. It is most logical and efficient to address this issue with Plaintiffs' challenges to the use of the Calsim II versus Dayflow comparisons in the Project Effects Analysis.

Plaintiffs also argue that the BiOp improperly attributes all (or substantially all) of the observed, historical upstream shift of X2 to Project Operations. It is preferable to address these contentions with related arguments in Part VII.A.(6).

level of development because the Dayflow model is using historical information as input. When comparing models to determine the effect of project operations, the best scientific practice is to keep the assumed level of development constant. *Id.* at ¶¶ 31-38.

- Regulatory Assumptions: CalSim II assumes a constant regulatory environment, whereas Dayflow uses a regulatory environment that has changed over time. Over the past 40 years, numerous regulatory programs have altered the way the projects are operated, including D-1485, D-1641, the Central Valley Project Improvement Act ("CVPIA"), the 1995 Water Quality Control Plan, and the EWA. These differences "further undermine the reliability of comparing historically based Dayflow values to the Calsim II model results." *Id.* at ¶¶ 39-41.
- Time Step: CalSim II operates on a monthly time step, whereas Dayflow operates on a daily time step. *Id.* at ¶ 42.
- Operational/Computational Guidelines: The Dayflow model incorporates real-world conservative operational tactics designed to avoid violating applicable regulations. In contrast, the CalSim II model operates strictly to that regulation. *Id.* at ¶ 44. Operating

conservatively results in higher modeled outflow. *Id.*

- Year Range: The Dayflow model uses a different historic time window than CALSIM II. The BiOp used values from 1967 to 2007 as inputs into the Dayflow model, while 1922 to 2003 were used for Calsim II. *Id.* at ¶ 52. This introduces additional error into any comparison between outputs of these two models because the time period used for the Dayflow model had a higher percentage of wet or above normal years, as compared to the time period covered by Calsim II. *Id.* at ¶ 53.
- Method for Calculating position of X2: The artificial neural network ("ANN") and the Kimmerer Monismith equation ("KM equation") are two methods of estimating X2. *Id.* at ¶ 46. The CalSim II studies used ANN to estimate the position of X2, while the Dayflow model uses the KM equation. *Id.* at ¶ 47. Holding all other variables constant, but varying the method (ANN v. KM) used, produces inconsistent results. At locations less than 75 kilometers ("km") from the Golden Gate, the KM equation results in an X2 estimate greater than (or farther upstream than) the ANN estimate. In contrast, at locations greater than 75 km from the Golden Gate, the KM equation provides an estimate less than the ANN estimate. *Id.* at 11, Fig. 2.

Mr. Miller opined that best scientific practice is to compare models that use consistent assumptions and methodologies. *See id.* at ¶¶ 38, 51, 54; *see also id.* at ¶ 41. The approach taken in the BiOp, quantitatively comparing Calsim II runs to Dayflow model outputs "introduces significant error into the analysis." *Id.* at ¶ 56.

Dr. Punt, a 706 Expert added that "[i]n principle, there is nothing wrong with fitting a model using a set of OMR/X2 valued from one model and making predictions using OMR/X2 values which are based on the output from a different model, as long as the two sets of values are calibrated.... Not calibrating the two sets of model outputs will lead to some bias in the inferences, with the level of bias dependent on the net effect of all the differences between the 'historical' and Calsim II values for the same years." Doc. 633-1 at 15.

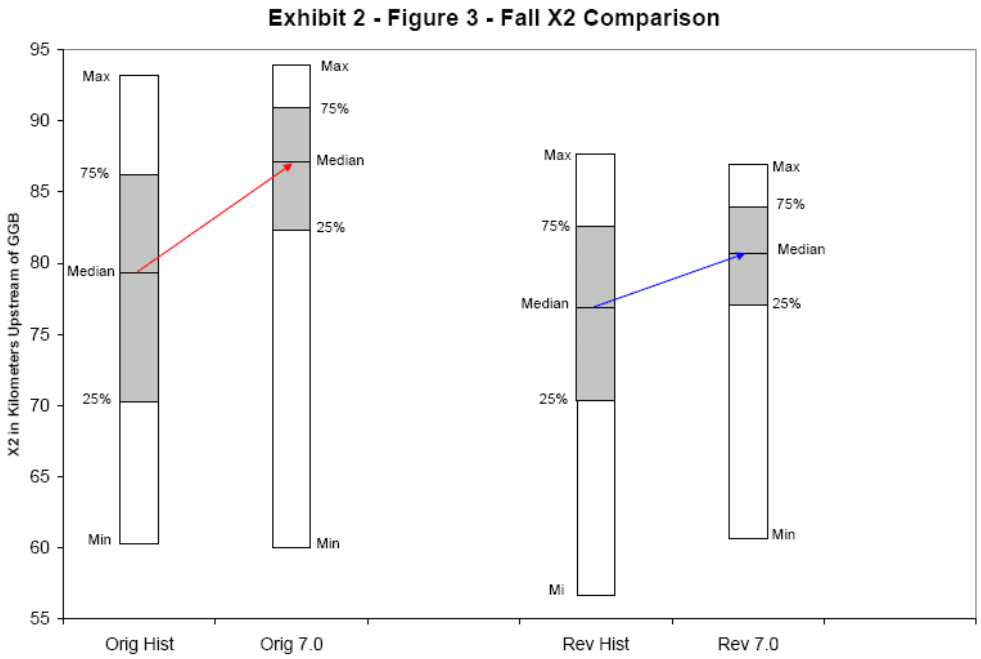
Mr. Derek Hilts, a FWS employee who previously served as "Engineer-in-Charge" of CVP/SWP modeling for Reclamation, disagrees with Mr. Miller's general opinion that comparing Calsim II and Dayflow outputs is *per se* scientifically unreliable, noting that the OCAP BA's Appendix D specifically compared Calsim II and Dayflow runs for the purposes of testing "Calsim II's ability to simulate the CVP/SWP system reasonably well." Decl. of Derek Hilts, Doc. 540, at ¶ 11. But, as Mr. Miller explains, this type of "validation comparison" is designed to "help

establish the credibility of the CalSim II model by showing that the model moves water, simulates operation of the export pumps, and so forth, with the same general timing and magnitude as actual historical data show." Second Miller Decl., Doc. 597, at ¶ 12. In fact, Mr. Miller points out that the detailed validation data contained in the OCAP BA demonstrate that, although Calsim II outputs generally track historical data, they "do not precisely match the actual historical data." *Id*. at ¶ 12. Because validation is "looking only at the general operational performance of the model," a validation comparison "does not need to control for the effects of all the differences in the model and the historical measurements...." *Id*. at ¶ 13.

More specifically, Mr. Hilts disagrees with Mr. Miller's critique that the divergent methods of calculating the position of X2 render the comparison used in the BiOp scientifically inappropriate. Mr. Hilts does not dispute Mr. Miller's conclusion that the KM and ANN equations produce marginally different outcomes. Instead, Mr. Hilts criticizes Mr. Miller for failing to "assert that any such error would have changed the conclusions drawn in the BiOp." Doc. 540 at ¶ 19.

Assumedly to demonstrate that the conclusion would not have changed, Mr. Hilts revisited the calculations in the BiOp, using the KM equation in both models to produce revised estimates of

the position of X2.[25] In performing this analysis, Mr. Hilts also attempted to correct for one of the other purported sources of bias -- the inconsistent year range -- as well as for a few incorrect data points found in the underlying data used in the BiOp. Doc. 540 at ¶¶ 17-18. This revised analysis, which is presented in Exhibit 2, Figure 2 to Mr. Hilts' declaration, is replicated below:



Doc. 540, Exhibit 2, Figure 2. According to Mr. Hilts, this figure demonstrates the "same general upstream movement" of X2 "discussed in the 2008 BiOp." *Id.* at ¶ 17.[26]

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[25] Mr. Hilts chose to use KM instead of ANN because "[w]orking with ANN is very complex"; "using ANN to estimate X2 had just been introduced to Calsim II when the 2008 OCAP BA was completed"; and "few outside DWR know how to work with [ANN]." Doc. 540 at ¶ 15.

[26] Mr. Miller rejoins that Mr. Hilts' revised analysis contains several errors. *See* Doc. 597 at ¶ 18(b)-(c). Even assuming, *arguendo*, Mr. Hilts' analysis was accurately performed, the comparison of Calsim II to Dayflow

Recognizing that his revised analysis demonstrates the same general upstream shift as the BiOp, Mr. Hilts criticizes Mr. Miller for failing to "quantify the effect of the alleged biases ostensibly embedded in the X2 comparison presented in the BiOp." *Id.* at ¶ 7. Federal Defendants contend that even if the Calsim II to Dayflow comparison introduced bias, that bias was not significant. However, the record suggests otherwise.

Recognizing that it is not possible to quantify all aspects of the error caused by the comparison of Calsim II runs to Dayflow output, Mr. Miller's reply declaration endeavored to quantify the bias in his reply declaration. *See* Second Miller Decl., Doc. 597. As with Mr. Hilts' revised calculations, Mr. Miller compared the results reported in the BiOp (Calsim II runs applying the ANN equation and Dayflow runs using the KM equation), to a revised set of results using the KM equation instead of ANN in the Calsim II runs. *Id.* at ¶ 14. Mr. Miller's analysis shows that project operations will cause an upstream shift in X2. Mr. Miller explained that the BiOp's comparison reflected a difference between the reported historic median of X2 [79 km] and the study 7.0 median [87 km] of 10% [(87 km - 79 km)/79]. Mr. Miller concluded that the median X2 for the CalSim 7.0 study using the KM equation (instead of using ANN) was 84 km (instead of 87 km). Finally, he identified the percent

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generates significant bias that is not addressed in the BiOp.

difference between the reported historic median estimate of X2 using the KM equation [79 km] and the CalSim study 7.0 median estimate of X2 using the KM equation [84 km] to be 6% [(84 km–79 km)/79 km]. *Id.* at ¶ 14; BiOp at 235-36. From this, Mr. Miller concluded 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim II study 7.0 results. *Id.* at ¶ 15. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. *Id.* at ¶ 16. Dr. Punt expressed a corroborating opinion, estimating that the bias created by failing to calibrate the models "seems non-trivial" and opining that it could be "as large as the differences seen in Figure E-19," the figure in the BiOp depicting the purported 10% shift in X2 between the historic/Dayflow runs and the Calsim II runs. Doc. 633-1 at 16.

Following a similar methodology, using the BiOp's Figure E-20 equation, Mr. Miller calculated the reduction in suitable habitat consistent with the change in the position of X2. A comparison of CalSim II study 7.0 with study 7.1 yielded a reduction in habitat area of 128 hectares (or 2.8%), and a comparison of study 7.0 with study 8.0 yielded a reduction in habitat area of 289 hectares (or 6.2%). Doc. 597 at ¶ 20; BiOp

at 266.

Mr. Miller opined that all errors/biases could have been avoided by comparing CalSim II study 7.0 -- designed as a current conditions baseline -- instead of the "historical" baseline in the BiOp, to the near-future 7.1 study.[27] However, Mr. Hilts points out that comparing Calsim II Study 7.0 to 7.1 and 8.0 is simply "not responsive to the need for comparisons with historical X2 locations," because none of the Calsim II simulations represent Delta conditions that existed from 1967 – 2007. Doc. 540 at ¶ 9. "With the Fall X2 comparison, []FWS wanted to investigate whether the continuation of the recent, as well as future, CVP/SWP operations would result in less or deteriorated habitat for delta smelt relative to the habitat that prevailed historically." *Id.* at ¶ 8. "The CalSim II simulations that Mr. Miller would have the FWS use do not" accomplish this. *Id.*

The theoretical problems with using a Calsim II to Calsim II comparison were manifest. As discussed above, when CalSim II was used to model current Project operations, and these results were then compared to the results of a CalSim II modeling run purportedly simulating past operations, the results "were nearly

[27] Mr. Miller performed a Calsim II to Calsim II comparison. The results indicate a 0.7 km upstream movement of X2, with a 0.8% change in X2 from current to near-current conditions. In a comparison of Calsim II Study 7.0 to Study 8.0 (a 2030 level of development scenario), X2 moved upstream only 1.1 km (1.2 % change). Doc. 597 at ¶20; BiOp at 235, 265. In contrast, the BiOp estimated approximately 8.7 km and 9.1 km changes, respectively, using Dayflow data as the baseline. BiOp at 265 (Figure E-19).

identical" despite significant operational changes in current operations as compared to past. BiOp at 204-205. The BiOp explains that "[t]he inaccuracies in CalSim [led FWS] to use actual data to develop an empirical baseline." *Id.* at 206.[28] FWS contends it had legitimate reasons to rely on a Calsim II to Dayflow comparison instead of a Calsim II to Calsim II comparison.

In light of the known and material resulting disparity, FWS's decision to use a Calsim II to Dayflow comparison to quantitatively justify its jeopardy and adverse modification conclusions, without attempting to calibrate the two models or otherwise address the bias created, was arbitrary and capricious and ignored the best available science showing that a bias was present. The BiOp specifically relied upon the quantitative nature of the Calsim II to Dayflow comparisons in many places. For example, in reference to the X2 shift and resulting effects on smelt habitat:

> The median X2 across the CALSIM II modeled scenarios were 10-15 percent further upstream than actual historic X2 (Figure E-19). Median historic fall X2 was 79km, while median values for the CALSIM II modeled scenarios ranged from 87 to 91km. The CALSIM II modeled scenarios all had an upper range of X2 at about 90km. The consistent upper cap on X2 shows that water quality

[28] The Independent Peer Review of the BiOp's Effects Analysis also noted and was "surprised at" the fact that the historical baseline "differed greatly" from CalSim II Study 7.0 simulated results. AR 008817. The Peer Review reasoned that this discrepancy "raises the question of how representative Study 7.0 is of current and near-future conditions." *Id.*

> requirements for the Delta ultimately constrain the upper limit of X2 in the simulations. These results were also consistent across WY types (Figure E-19) with the differences becoming much more pronounced as years became drier. Thus, the proposed action operations will affect X2 by shifting it upstream in all years, and the effect is exacerbated in drier years.

BiOp at 235. The BiOp does not explain to what extent the ultimate jeopardy/ adverse modification conclusions were based upon the calculated magnitude (10-15 percent) of the X2 shift, rather than the existence of a shift. It cannot be determined whether the BiOp would have reached the same conclusion had this bias not been present.

Federal Defendants concede but understate that "the two models are not perfectly calibrated, and a slight transformation of the data occurs when the analysis switches from one model to the other, the BiOp acknowledges this slight shift." Doc. 660 at 36. Nevertheless, FWS concluded in its "scientific judgment [] that the CalSim [II]-to-Calsim [II] output was far worse." *Id.* (citing BiOp at 207). Federal Defendants argue this was a choice between "one comparison that yielded a slight calibration issue and another that completely masked altogether the variable sought to be compared...." and that "it would have been irrational for the Service to proceed with [a Calsim II to Calsim II comparison" after discovering its flaws. *Id.* This may be the case, but it does not follow that what FWS did with the Calsim II to Dayflow comparisons was rational or based upon the best available

science.

FWS had actual notice of scientific concerns with comparing historical data to CalSim II simulated data. DWR Deputy Director Jerry Johns, on October 24, 2008, submitted comments to FWS on the draft effects analysis, generally cautioning against the comparison of modeled data with actual data:

> USFWS is using historic data for comparison to CalSim II simulations. Great caution should be taken when comparing actual data to modeled data. CalSim II modeling should be used in a comparative mode. In other words, it should be used to compare one set of model runs to another. For example, it would be appropriate to compare CalSim II modeling of one demand alternative to another to analyze the incremental effects.

AR 008671; *see also* AR 008668 (further explaining unreliability problems comparing historic and modeled data). Although neither Mr. Miller nor any interested party suggested that comparing Dayflow to Calsim II data was a scientifically invalid methodology prior to the issuance of the BiOp, the BiOp does not recognize the essential methodological defect, or explain how any of the conclusions it reached account for it. Nor does the BiOp explain how it is able to attribute the changes in X2 it found between the "historic" baseline and the CALSIM studies to the proposed action, and not to any of the other differences between the Dayflow and Calsim II models. Instead, FWS only rationalizes that it opted to use the "historic" baseline rather than CALSIM Study 7.0 as the baseline because, "the CALSIM monthly simulation model does not capture a precise Delta operation.... [Thus], the

inaccuracies in CALSIM lead us to use actual data to develop an empirical baseline." BiOp at 204 & 206. This statement may explain the reasons for FWS's decision, but it does not justify its ultimate conclusion.

This is of particular concern because DWR, a joint operator of the projects communicated its scientific and operational concerns based on known available science. DWR and Reclamation have legal obligations to allocate water supply reasonably and responsibly, not solely to save the species. As discussed in below at Part VII.B, FWS's focus on its responsibilities to the species appears to have caused it to ignore its own regulations' obligations to consider impacts to the overall water supply and additional uses. The potential impacts of inaccurate quantitative analyses in the BiOp cannot be understated.

Defendants argue FWS's decision to compare the two models to quantify the shift of X2 was a reasonable scientific decision, even though other experts may disagree. Doc. 660 at 17-19; Doc. 661-3 at 13-14. Federal Defendants cite *Lands Council*, 537 F.3d at 993, to justify FWS's modeling decisions as entitled to deference, because it is a matter "within its area of special expertise, at the frontiers of science."[29] As a general rule,

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[29] *Lands Council* also held that an agency is not required "to conduct any particular test or to use any particular method, so long as 'the evidence ... provided to support [its] conclusions, along with other materials in the record,' ensure that the agency 'made no clear error of judgment that would render its action arbitrary and capricious.'" *League of Wilderness Defenders-*

choices regarding modeling methods are exactly the sort of choices that, under the APA, are left to the expert agency in the exercise of its discretion. ***NWF v. EPA***, 286 F.3d at 565. A court "may reject an agency's choice of a scientific model only when the model bears no rational relationship to the characteristics of the data to which it is applied." *Id.* at 565 (internal quotations and citations omitted). *Lands Council* instructs that a court is "not free to impose on the agency [its] own notion of which procedures are best.... Nor may [it] impose procedural requirements not explicitly enumerated in the pertinent statutes." 537 F.3d at 993 (internal citations and quotations omitted); *id.* at 1000 (finding agency did not act arbitrarily "in relying on its own data and discounting the alternative evidence offered" by plaintiffs because "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive") (citations omitted).

In ***NWF v. EPA***, the EPA evaluated several regulatory options for economic feasibility, applying a particular model to predict

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Blue Mountains Biodiversity Project v. U.S. Forest Serv., 549 F.3d 1211, 1218 (9th Cir.2008) (quoting *Lands Council*, 537 F.3d at 993). But *Lands Council* and *Blue Mountains Biodiversity Project* arose under the National Forest Management Act ("NMFA") and/or the National Environmental Policy Act ("NEPA"), neither of which include the additional requirement, found in the ESA, that the agency use the "best available science." Although *Lands Council's* general holding that a court must be deferential to an agency's choice of methodology in an area of its expertise, the agency is not free to ignore the best available science.

whether businesses were likely to go bankrupt under the weight of additional regulation. NWF criticized the model on several grounds, including that the model had "an error rate of at least 15%." *Id.* at 565. The D.C. Circuit examined and rejected each critique, reasoning that none called into question the model's reliability. *Id.*

Here, however, undisputed expert testimony offered by DWR, a co-operator of the Projects, calls into question the manner by which FWS utilized the two models to evaluate the impact of project operations on the position of X2. The Calsim II model was developed by DWR and Reclamation as a planning tool to simulate State Water Project and Central Valley Project operations. DWR, one of the agencies with special expertise in the use and application of Calsim II, *see* BiOp at 207; Miller Decl., Doc. 548-1, at ¶ 5-7, raised cautions and objects to the manner in which FWS used the model. Federal Defendants do not rebut the undisputed expert evidence that using such comparisons for quantitative purposes is scientifically improper. All experts in this case agree that data from two different models should not be compared without calibration. Doc. 633-1 at 13-17 (706 expert report); Miller Decl., Doc. 548-1, ¶¶ 22-55; Second Miller Decl., Doc. 597, ¶¶ 4-22. In other words, even though no superior set of models have been identified, the chosen models were indiscriminatly used without addressing an important factor,

the potential (and apparently real and significant) bias created when the results of two different computer models were used to perform quantitative comparisons. Unlike ***NWF v. EPA***, where the agency applied a model that was deemed reliable, here, FWS has not addressed or explained the material bias created by its methodological choices. It cannot be determined whether FWS would have reached the same result had the bias been considered or addressed. FWS must do so on remand.

(2) Does the Use of Dayflow to Represent the Baseline in the Project Effects Analysis Improperly Attribute Past Effects to the Projects?

DWR asserts that FWS's use of an "historical baseline" was per se unlawful because the ESA's implementing regulations "require the Service to use current operations, not past operations, as the baseline for its effects analysis." Doc. 548 at 7-8. In support of this contention, DWR cites 50 C.F.R. § 402.02, which defines the "environmental baseline" to include:

> the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

See also Consultation Handbook at 4-22 (baseline includes "effects of past and ongoing human and natural factors leading to the current status of the species") (emphasis added). In addition, DWR cites ***NWF v. NMFS II***, 524 F.3d at 930, which held

that an agency action "only 'jeopardize[s]' a species if it causes some new jeopardy." (Emphasis added.) DWR argues that "[b]ecause [FWS's] baseline looks to decades past, it cannot be used as a basis for assessing any 'new jeopardy" posed by Project operations going forward." Doc. 548 at 8.[30]

DWR oversimplifies the issue. FWS's BiOp sought to determine whether ongoing and future coordinated operations of the CVP and SWP would cause jeopardy to the delta smelt or adversely affect its critical habitat. Arbitrarily setting the baseline at 2008, when the BiOp's analysis was finalized, would not have captured the impacts of then-ongoing project operations. The agency had discretion to use a historic baseline.

(3) Use of Comparisons Between CALSIM and DAYFLOW Model Outputs to Justify Imposition of Component 3 (Action 4), the Fall X2 Action.

In addition to utilizing comparisons of Calsim II and Dayflow data in the Project Effects section to demonstrate that Project Operations affect the location of X2, the BiOp relies on these comparisons to justify the imposition of RPA Component 3 (Action 4, or the "Fall X2 action"). The BiOp's "Justification" section discussing Action 4 references the Calsim II to Dayflow comparison:

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[30] Plaintiffs advance the related argument that FWS's use of a historic baseline caused FWS to mix the effects of the OCAP with the effects of all the other changing factors that occurred during the historical period of 1967 to 2007 represented by the Dayflow data. Doc. 551 at 24. However, the post-record expert testimony provided in support of this argument was stricken. Doc. 750 at 3, at ¶9.

> **The Effects section clearly indicates there will be significant adverse impacts on X2, which is a surrogate indicator of habitat suitability and availability for delta smelt in all years (Figures E-19 and E-25 in Effects section).... The action is focused on wet and above normal years because these are the years in which project operations have most significantly adversely affected fall (Figure E-27 in Effects section) and therefore, actions in these years are more likely to benefit delta smelt.**

BiOp at 373. Figures E-19 and E-25 compare historic X2 locations simulated by Dayflow to conditions under planned project operations simulated by Calsim II:

Figure E-19. X2 (km) during September to December based on historic data and CALSIM II model results. The center line in the box is the median and the outer box boundaries are the first and third quartiles.

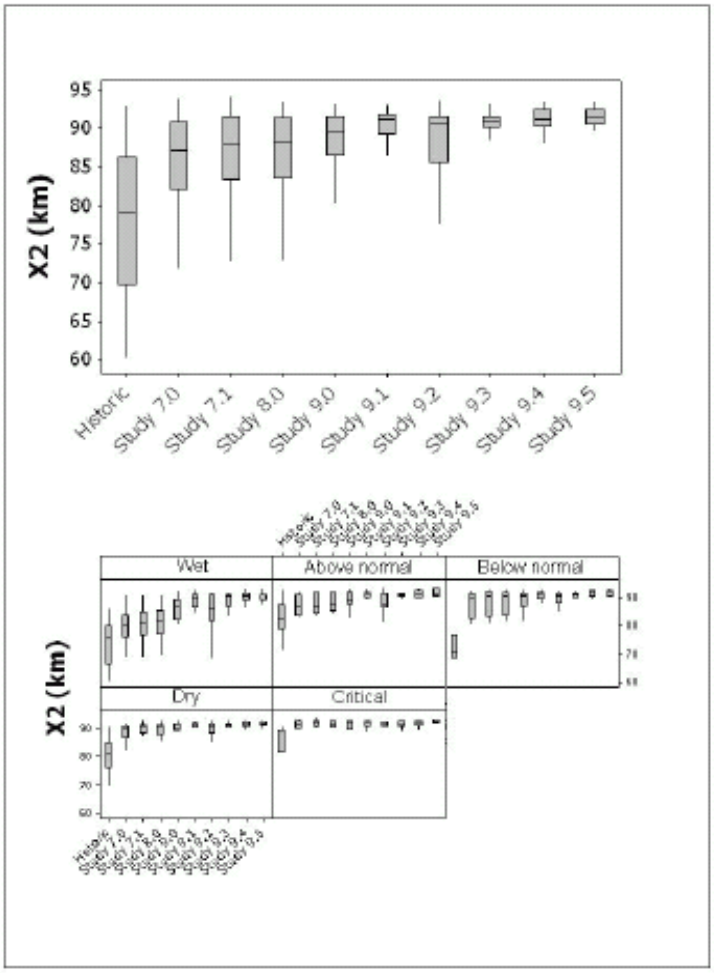
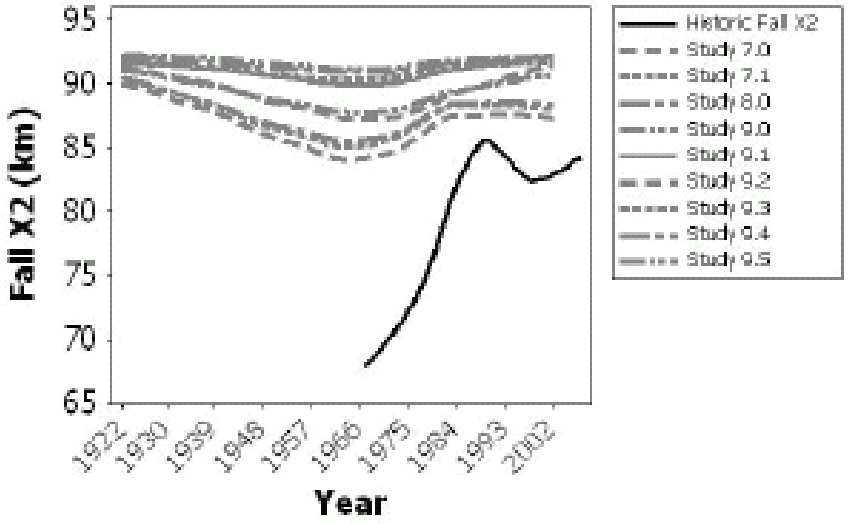


Figure E-25. Smoothed trend lines for the time series of historic and CALSIM II-modeled fall X2.



BiOp at 265, 271.

Undisputed expert testimony establishes the likelihood that the comparison of Dayflow to Calsim II data introduced significant error into the analysis that forms the basis for Figures E-19 and E-25. Mr. Miller concluded 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim II study 7.0 results. Second Miller Decl., Doc. 597, at ¶ 15. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. *Id.* at ¶ 16. Dr. Punt gave a consistent opinion, estimating that the bias created by failing to calibrate the models "seems non-trivial" and

opining that it could be "as large as the differences seen in Figure E-19," the figure in the BiOp depicting the shift in X2 between the historic/Dayflow runs and the Calsim II runs. Doc. 633-1 at 16.

Federal Defendants do not respond directly to these assertions of bias. Instead, they point out that the historical X2 data was not the only basis for Action 4. Doc. 660 at 49. The BiOp describes multiple sources of information that were considered:

> This analysis of the effects [of the] proposed CVP and SWP operations on the delta smelt and its critical habitat uses a combination of available tools and data, including the CALSIM II model outputs provided in the appendices of Reclamation's 2008 Biological Assessment, historical hydrologic data provided in the DAYFLOW database, statistical summaries derived from 936 unique 90-day particle tracking simulations published by Kimmerer and Nobriga (2008), and statistical summaries and derivative analyses of hydrodynamic and fisheries data provided by Feyrer et al. (2007), Kimmerer (2008), and Grimaldo, et al. (accepted manuscript).

BiOp at 204; *see also* Feyrer Decl., Doc. 541, at ¶ 17. Additionally, "[t]he Service's examination of habitat suitability during fall is derived from published literature and unpublished information linking X2 to the amount of suitable abiotic habitat for delta smelt (Feyrer et al. 2007, 2008)." BiOp at 234. The BiOp expressly recognizes that the modeling does not precisely represent historic X2, as do the peer-reviewed studies on which the BiOp relies in part for this component. *See* BiOp at 204; AR 018278-018306 (Feyrer, *et al*. (2008)).

The justification for Action 4 relies heavily on the

quantitative analyses presented in Figures E-19 and E-25. *See* BiOp at 373. Whether Action 4, which has substantial adverse impacts on the water supply, is justified in the absence of the quantitative analysis cannot be determined. These questions are too serious to go unanswered and must be remanded to the agency for further explanation and/or correction.

(3) Other Challenges to the Fall X2 Action.

Plaintiffs raise additional challenges to the justification for the Fall X2 action, arguing "neither the BiOp nor the record demonstrate that Component 3 (Action 4) is necessary to avoid jeopardy to the delta smelt or destruction or adverse modification of its critical habitat, or that it will materially benefit the species or its habitat." Doc. 697 at 25.

a. Plaintiffs' Argument that Action 4 is an "Untested Hypothesis."

Plaintiffs maintain that Action 4 is nothing more than an "untested hypothesis," emphasizing that FWS acknowledges the need to assess the efficacy of Action 4 over time:

> The Service shall conduct a comprehensive review of the outcomes of the Action and the effectiveness of the adaptive management program ten years from the signing of the biological opinion, or sooner if circumstances warrant. This review shall entail an independent peer review of the Action. The purposes of the review shall be to evaluate the overall benefits of the Action and to evaluate the effectiveness of the adaptive management program. At the end of 10 years or sooner, this action, based on the peer review and Service determination as to its efficacy shall either be continued, modified or terminated.

BiOp at 283.

This does not render Action 3 a mere "hypothesis," nor does this "demonstrat[e] the absence of a rational connection between Action 4 and an increase in smelt abundance." Doc. 697 at 25. It is not inconsistent to find an action necessary, while also calling for an evaluation whether that action actually produced the expected outcomes. It is of no moment that in a research paper Mr. Feyrer referred to the X2 requirement as "the hypothesis that the combined effects of pre-adult abundance and the amount of suitable abiotic habitat (or X2) during autumn affect recruit abundance the following summer." AR 018285 (Feyrer unpub. 2008). He is a scientist gathering further information about the relationship between X2 and smelt population dynamics. The record does not suggest this is scientifically improper. It was not clearly erroneous for FWS to rely upon Feyrer's 2008 research paper.

b. FWS' Reliance on the Feyrer Papers.

FWS based its effects analysis of X2 in part[31] on two

[31] Plaintiffs argue that "FWS based its effects analysis of X2 entirely on two articles written by Feyrer, et al." Doc. 551 at 34 (emphasis added). Federal Defendants point to pages 152 to 179 of the BiOp to demonstrate that FWS considered a broad range of other materials in analyzing X2. However, these pages are not part of the BiOp's Effects Analysis nor the description and justification for Action 4. Rather, they describe FWS's view of the delta smelt's status and description of the environmental baseline. The portion of the BiOp that actually examines the purported relationship between X2 and smelt habitat states that FWS's "evaluation of habitat suitability considered three specific elements: X2, total areas of suitable abiotic habitat, and the predicted effect on delta smelt abundance the following summer." BiOp at 234-

articles written by Feyrer et al., which purported to show a correlation between X2 in the autumn and subsequent delta smelt abundance. *See* BiOp at 235-38 (citing Feyrer et al. (2007); Feyrer et al. (2008)). Plaintiffs argue that these articles did not represent the best available science because "the correlation they claimed to find was driven by the presence of a single unrepresentative data point." Doc. 551 at 34. Even assuming the scientific validity of the 2007 and 2008 Feyrer analysis, Plaintiffs contend the BiOp's X2 conclusions far exceed what the articles scientifically support. *Id.*

Plaintiffs' letter, responding to a draft of the BiOp, identified a purported flaw in the Feyrer et al. (2008) analysis: the supposed correlation between Fall X2 and delta smelt abundance Feyrer et al. was driven by the presence of a single, apparently outlier, data point. Removing that data point resulted in a finding of no statistically significant

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35. The description of the first of these three elements refers to the "CALSIM II modeled results" and "Feyrer 2007, 2008." BiOp at 235. Similarly, the second step of the evaluation, modeling the location of X2 purportedly to determine the "total surface area of suitable abiotic habitat," also relied on "modeled X2" and the Feyrer 2008 paper. BiOp at 235. Finally, in the third step of the evaluation, FWS allegedly used the modeled X2 data to estimate the effect of Project operations on delta smelt abundance. BiOp at 236. This third step cited extensively to the Feyrer (2007) article and a Feyrer 2008 paper, along with a citation to Bennett (2005). Facially, the X2 analysis relied on the modeled X2 data, Feyrer's work, and Bennett's 2005 paper.

Plaintiffs suggest that the modeled X2 data did not constitute a separate justification for Action 4 because the reason FWS gave in the BiOp for presenting the Calsim II model results in a monthly time step was "to be consistent with previous analyses (Feyrer 2007, 2008)." BiOp at 235. But, this does not mean that the Calsim II data was somehow dependent upon Feyrer's work. Rather, that data was presented in such a way to be consistent with the way Feyrer analyzed data. In the final analysis, Action 4 did rely extensively, but not exclusively, on Feyrer's articles.

relationship between Fall X2 and the abundance of delta smelt. *See* SLDMWA & SWC Letter to NMFS and FWS (Oct. 20, 2008) at 2 (AR 006407). As the letter noted, "a correlation solely reliant upon a single data point cannot reasonably be considered as an actual indicator of cause." *Id.* Plaintiffs' argument continues:

> That there was no statistically significant relationship between X2 and delta smelt abundance during the 1987-2007 period should not have been surprising given that Feyrer et al. found no statistically significant relationship between the two factors for the 1968-1986 period or for the entire 1968-2007 period. Feyrer et al. (2008) at 14 (AR 018291). Nor was it surprising considering that—as the Feyrer et al. (2008) article conceded—the existing best available science on delta smelt showed no direct correlation between the location of Fall X2 and delta smelt abundance. Feyrer et al. (2008) at 8 ("[P]revious analyses have not shown simple relationships between X2 and delta smelt abundance.") (AR 018285).

Doc. 551 at 35.

Federal Defendants respond:

> [U]nless data points are excluded to control for a specific variable, or for some other explicit reason that is central to measuring the relationship at issue, there is no scientific reason to remove a data point from an analysis just because it changes the result. In any event, removing the data point challenged by Plaintiffs does not appreciably change the result – the result goes from a 95% probability the relationship is not due to chance to a 92% probability that the relationship is not due to chance. Moreover, this is an argument that can go both ways. Removing other individual data points would increase the statistical significance.

Doc. 660 at 44. Federal Defendants are correct that removing a data point simply because it changes the result would be arbitrary. Plaintiffs do not point to any scientific basis, let

alone an undisputed one, for excluding the so-called "outlier" point, other than that it is an outlier. Plaintiffs do not show the point is erroneous or identify competing studies that reach different opinions from Feyrer that FWS failed to consider. This is a scientific dispute among experts over which the agency is owed deference.

c. Do the Studies Cited in the BiOp Support FWS's Conclusion that Fall X2 Determines the Extent of Suitable Smelt Habitat?

The BiOp concludes that to avoid jeopardy the RPA Actions must "[i]mprove fall habitat for delta smelt by managing [] X2 through increasing Delta outflow during fall when the preceding water year was wetter than normal." BiOp at 369; *see also* BiOp at 374 ("Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008)."). Plaintiffs argue that none of the articles FWS cited in the BiOp actually support FWS's conclusion that the location of X2 determines the amount of suitable habitat for the delta smelt. *See* Doc. 551 at 39-41.

(1) Feyrer (2007).

Plaintiffs first criticize the BiOp's reliance on a 2007 Canadian Journal of Fisheries and Aquatic Sciences paper by Feyrer, Nobriga, and Sommer, three scientists then working for Plaintiff DWR, entitled, "Multidecadal trends for three declining fish species: habitat patterns and mechanisms in the San

Francisco Estuary, California, USA." AR 018266-77. That paper used a generalized additive model to assess the relationship between changes in environmental quality for delta smelt (particularly salinity and turbidity) and the abundance of delta smelt. *Id.*

The paper demonstrated that a statistically significant relationship existed between salinity and turbidity in the fall months and the abundance of juvenile delta smelt the following summer for the period of 1987-2004. *Id.* This time period was chosen because it corresponded to the invasion of the *Corbula amurensis* clam which has resulted in significant ecological changes to the Delta. AR 018270. The results demonstrated that 63 percent of sampling stations showed statistically significant declines in environmental quality in the fall, with the western and southeastern regions of the Delta suffering the most substantial long term declines in habitat quality, while the area at the confluence of the Sacramento and San Joaquin Rivers least affected by the changes in fall habitat quality. *Id.*

The Feyrer (2007) analysis uses the results of a 2005 study by William Bennett published in the Journal of San Francisco Estuary and Watershed Science, which concluded: "Factors defining the carrying capacity for juvenile delta smelt are unknown, but may include a shrinking volume of physically suitable habitat combined with a high density of competing planktivorous fishes

during late summer and fall." AR 017004.

The BA acknowledged the results of this 2007 study, including the conclusion that fall habitat conditions have population level effects:

> Based on a 36-year record of concurrent midwater trawl and water quality sampling, there has been a long-term decline in fall habitat environmental quality for delta smelt (Feyrer et al. 2007). The long-term environmental quality declines for delta smelt are defined by a lowered probability of occurrence in samples based on changes in specific conductance arid Secchi depth. Notably, delta smelt environmental quality declined recently coinciding with the POD (Figure 7-8). The greatest changes in environmental quality occurred in Suisun Bay and the San Joaquin River upstream of Three Mile Slough and southern Delta (Figure 7-9). There is evidence that these habitat changes have had population-level consequences for delta smelt. The inclusion of specific conductance and Secchi depth in the delta smelt stock-recruit relationship described above improved the fit of the model, suggesting adult numbers and their habitat conditions exert important influences on recruitment.

AR 010626; *see also* AR 10628-29 (reproducing maps and graphics showing habitat declines and geographic distribution of declines from Feyrer (2007)).

The conclusions in Feyrer (2007) were also recognized in the January 2008 report on the Pelagic Organism Decline by the Interagency Ecological Program, which reached nearly identical conclusions about the effects of declining fall habitat quality on delta smelt abundance. *See* AR 016938, 016954, 016957.

Plaintiffs level several criticisms at Feyrer (2007) and the BiOp's use of the study. First, Plaintiffs complain that the Feyrer study "repeatedly states that the article supports only the 'hypothesis' that EQ (a metric devised by Feyrer that

incorporates two factors – secchi depth and temperature – in addition to salinity) is 'an important predictor of delta smelt abundance during the 1987-2004 post-*Corbula* period.'" Doc. 697 at 29 (citing AR 018271). The use of the term "hypothesis" does not undermine Feyrer's conclusions, as articulating a hypothesis is a step in the scientific method.

Plaintiffs next point out that while Feyrer (2007) found a statistically significant relationship between the location of X2 and delta smelt abundance from 1987-2004, there was no statistically significant correlation for the twenty years prior to *Corbula's* arrival (1968-1986). AR 018271. The article acknowledged "[b]iotic variables, most notably competition, predation, and food availability, could have also played a major role in controlling the distribution" of delta smelt and "[t]he recent step change in the abundance of pelagic fish suggests that salinity alone may not be sufficient to explain long-term trends in estuarine management." AR 018275. The article confirms that even when considering specific conductance (i.e., X2), secchi depth, and temperature together, those three factors collectively only predict 25.7% of future delta smelt occurrence. AR 018271. Finally, the article concludes that "the degree to which EQ could be used for management purposes remains unclear." AR 018275.

Tucson Herpetological Society, 566 F.3d 870, held that an agency may not rely on "underdeveloped and unclear" studies to

support ESA findings. There, an earlier FWS finding concluded that population dynamics information for the flat-tailed horned lizard was "limited and inconclusive." *Id.* at 878. Nevertheless, FWS relied on these uncertain studies to infer that the lizard population remained viable throughout most of its range. *Id.* The Ninth Circuit found that FWS's "affirmative[] reli[ance] on ambiguous studies as evidence of persistence..." to be unreasonable because "the studies do not lead to the conclusion that the lizard persists in a substantial portion of its range and therefore cannot support the Secretary's conclusion." *Id.* at 879.

FWS's reliance on Feyrer (2007) is distinguishable. Although Feyrer (2007) acknowledges that multiple factors may be contributing to the delta smelt's decline, the study affirmatively finds a statistically significant, albeit limited, correlation between the fall location of X2 and subsequent delta smelt abundance. This finding is not uncertain. It acknowledges the context of a complex ecosystem in which many factors may impact the species. Feyrer's X2 analysis explains only 25.7 percent of subsequent year abundance. This is not a *de minimis* impact. (It goes, rather, to the agency's overemphasis on X2 to impose a significantly restrictive fall RPA component.) Plaintiffs cite no studies that demonstrate the cause of the remaining 74.3 percent variation in abundance. FWS's reliance on

Feyrer (2007) was not *per se* unreasonable, however, FWS's use of the study to justify operational restrictions is more questionable.

(2) The Feyrer (2008) Paper.

A 2008 paper by the same authors (Feyrer, Nobriga, Sommer), along with Ken Newman of FWS, appeared in the Estuaries and Coasts journal. *See* AR 018278-306. This expanded upon the 2007 research, used statistical analyses, including both Ricker and Beverton-Holt type models, to compare Fall X2, habitat area for and subsequent abundance of delta smelt. *Id.* Like Feyrer (2007), it concluded that fall habitat quality had a statistically significant effect on subsequent delta smelt abundance, determining that the model incorporating prior abundance and X2 accounted for 66 percent of the variability in subsequent abundance. *Id.* The authors identified a number of reasons why the location and extent of fall habitat affected subsequent abundance:

> First, positioning X2 seaward during autumn provides a larger habitat area which presumably lessens the likelihood of density-dependent effects (e.g., food availability) on the delta smelt population. For example, food availability during autumn for adult haddock (*Melanogrammus aeglefinus*) likely improves juvenile recruitment the following year (Friedland et al. 2008). Second, a more confined distribution may increase the probability of stochastic events that increase mortality rates of adults. For delta smelt, this includes both predation, as well as anthropogenic effects such as contaminants or water diversion loss (Sommer et al. 2007).

AR 018293. The study concluded: "Comparing the first ten years

of the time series to the last ten years, the amount of suitable abiotic habitat for delta smelt during autumn has decreased anywhere from 28% to 78%, based upon the least and most restrictive habitat definitions, respectively." AR 018293-94.

Like Feyrer (2007), Feyrer (2008) narrowly considered abiotic factors alone, and limited its focus on X2. Feyrer (2008) concludes that manipulating X2 might affect delta smelt populations, but that "the specific mechanisms by which X2 affects delta smelt remain poorly understood." AR 018294. Because of this uncertainty, Feyrer (2008) recommended that any "'real world' applications of [its] results should incorporate an adaptive management approach, allowing resource manager[s] to adjust actions in response to new data collected on delta smelt habitat conditions and use." *Id.*

Other than arguing that Feyrer (2008), like Feyrer (2007), used the "outlier" data point, Plaintiffs submitted no other substantive criticism of Feyrer (2008). FWS made no error in considering Feyrer (2008).

(3) The Bennett (2005) Article.

Plaintiffs criticize the BiOp's citation of Bennett (2005), because, like the Feyrer studies, this article does not conclude that salinity or the location of X2 is a determinative factor in delta smelt abundance. Bennett (2005) specifically addresses: "[w]hat is the impact of human activities, particularly water

export operations, on population abundance?" AR 017061. Bennett (2005) surveyed available data and concluded: "[t]his synthesis of the available information cannot answer th[is] vital management question." AR 017062. "The lack of appropriate data ... impedes efforts to resolve th[is] issue ...." AR 017004.

The BiOp does not rely on Bennett (2005) as the "be all end all" to address the management question. The BiOp cites Bennett (2005) for a series of factual assertions, including the premise that: "There is a statistically significant stock-recruit relationship for delta smelt in which pre-adult abundance measured by the FMWT positively affects the abundance of juveniles the following year in the TNS." BiOp at 178. Plaintiffs do not disagree that Bennett supports this assertion. *See* AR 017035 (reviewing various studies finding a relationship between X2 position and smelt abundance). Plaintiffs have not demonstrated that the BiOp misrepresented Feyrer (2007), Feyrer (2008), or Bennett (2005), or that any of these studies are not part of the best available science.

d. Does the Best Available Science Support the Assumption that X2 Is a Surrogate for Smelt Habitat?

Plaintiffs object that FWS' use of X2 as a "surrogate" indicator for delta smelt habitat suitability is not supported by the best available science, arguing: "FWS stretched the limited findings of Feyrer et al. (2007 & 2008) far beyond defensible

application, converting a tentative finding that the location of X2 might influence habitat suitability into a definite conclusion that X2 alone determines the area and extent of delta smelt habitat for delta smelt." Doc. 551 at 38.

Feyrer (2007) discussed its limitations: "[T]he degree to which EQ [Feyrer's three-part index of environmental quality, which included salinity] could be used for management purposes is unclear.... salinity alone may not be sufficient to explain long-term trends in estuarine management." AR 018275. Feyrer (2008) concluded, "[o]ur results suggest that managing estuarine flow or X2 during autumn can have positive effects on delta smelt habitat and abundance." AR 018292. The FWS BiOp relied on these two studies to conclude: "Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008)." BiOp at 374. This is one scientific interpretation of X2's role. It may be a "stretch" or unjustified expansion of Feyrer (2007) or Feyrer (2008), however, when all the disputed X2 studies are considered, X2 has a measurable effect on smelt abiotic habitat.[32]

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[32] The BiOp asserts that Component 3 will improve smelt habitat "quality and quantity" in the fall. BiOp at 282. Plaintiffs point out that FWS has explicitly recognized that delta smelt habitat must be defined to encompass, in addition to space and salinity, food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding; habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species, including physical habitat, water, and river flow. 59 Fed. Reg. 65,256, 65,259 (Dec. 19, 2004). Plaintiffs complain that "X2 is a metric that describes only a two-dimensional space consisting of a particular salinity at

a. Are Delta Smelt Habitat Limited?

Plaintiffs assert that FWS ignored available evidence SLDMWA and SWC presented to FWS indicating that delta smelt are particularly unlikely to be habitat-limited, given their record low abundance. SLDMWA-SWC Letter at 5-6, AR 006410-006411.

It is unquestioned that delta smelt survey results show decreasing abundance throughout the 2000s, with their current abundance at a historic low. BiOp at 154. In addition, the BiOp notes that "most life stages of the delta smelt are now distributed across a smaller area than historically," and recognizes that this is likely due to multiple factors, including channelization, conversion of Delta islands to agriculture, water project operations, salinity, turbidity, high summer water temperatures, and predacious species. BiOp at 152-53, 157. Plaintiffs argue that "simply because the delta smelt may currently occupy lesser spatial area than they did previously, does not mean that forcing a relocation or expansion of X2 will impact the species beneficially or at all." Doc. 697 at 33. Most of Plaintiffs' evidence submitted to support this argument

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a specific depth in the Delta's channels; it is not coterminous with the dynamic three-dimensional space that supports the abiotic and biotic components that define delta smelt habitat." Doc. 697 at 35. In support of this assertion, Plaintiffs refer to many statements in the studies cited in the BiOp, indicating that X2 does not explain all variability in delta smelt abundance and/or distribution. *Id.* Those very same studies and the BiOp acknowledge that, while X2 does not explain everything, it explains enough to consider X2 a proxy for critical habitat and to structure management prescriptions around X2. That X2 is an imperfect proxy is relevant to the degree of uncertainty and justification FWS provides for the specific RPA prescriptions imposed.

has been stricken. *See* Doc. 750 at ¶ 8 (striking paragraphs 14-17 of the Declaration of Charles H. Hanson, Doc. 395).

Plaintiffs insist that the BiOp itself admits that the delta smelt is not currently habitat-limited, citing pages 237 and 374. Page 237 makes such an admission, but it is qualified:

> Combined, these effects of project operations on X2 will have significant adverse direct and indirect effects on delta smelt. Directly, these changes will substantially decrease the amount of suitable abiotic habitat for delta smelt, which in turn has the possibility of affecting delta smelt abundance through the depensatory density-dependant mechanisms outlined above. Because current abundance estimates are at such historic low levels, depensatory density-dependence can be a serious threat to delta smelt despite the fact that the population may not be perceived to be habitat limited. It is clear from published research that delta smelt has become increasingly habitat limited over time and that this has contributed to the population declining to record-low abundance levels (Bennett 2005; Baxter et al. 2008; Feyrer et al. 2007, 2008; Nobriga et al. 2008). Therefore, the continued loss and constriction of habitat proposed under future project operations significantly threatens the ability of a self-sustaining delta smelt population to recover and persist in the Estuary at abundance levels higher than the current record-lows.

(Emphasis added). Pages 374-75 state:

> The persistence of this significant hydrologic change to the estuary threatens the recovery and persistence of delta smelt. Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008). The long-term upstream shift in X2 during fall has caused a long-term decrease in habitat area availability for delta smelt (Feyrer et al. 2007, 2008), and the condition will persist and possibly worsen in the future. This alone is a significant adverse effect on delta smelt.
>
> However, the problem is further complicated because

> there are several lines of published peer reviewed scientific research that link habitat alteration to the decline of delta smelt (Bennett 2005; Feyrer et al. 2007; Nobriga et al. 2008). An important point regarding this action is that because of the current, extremely low abundance of delta smelt, it is unlikely that habitat space is currently a limiting factor. However, it is clear that delta smelt have become increasingly habitat limited over time and that this has contributed to the population attaining record-low abundance levels (Bennett 2005; Baxter et al. 2008; Feyrer et al. 2007, 2008; Nobriga et al. 2008). Further, as detailed in the Effects section, persistent degraded or worsened habitat conditions are likely to contribute to depensatory density-dependent effects on the delta smelt population while it is at historical low levels, and would at some point in the proposed term of this project, limit delta smelt recovery.

While "admitting" that the delta smelt may not be habitat-limited, the smelt has become "increasingly habitat-limited over time," contributing to the population's decline, and that worsening habitat conditions may limit smelt recovery. Plaintiffs have not presented any record best available scientific evidence not considered by FWS that contradicts this conclusion.

b. FWS' Use of a Linear Model Instead of a Multiplicative Stock-Recruit Model .

Plaintiffs next argue that FWS committed a serious scientific error by employing a linear additive model to determine the effect of Fall X2 on delta smelt abundance. *See* BiOp at 268, Figure E-22. Dr. Deriso opines that FWS' use of the linear additive model ran counter to decades of established scientific consensus that linear models are not effective for

modeling fish populations. Deriso Decl., Doc. 396, at ¶ 80. He claims that standard practice in fisheries management is to use a multiplicative stock-recruit model, such as the Beverton-Holt or Ricker models, both of which are among the standard tools of the relevant science. *Id.* at ¶ 83; *see also* Hilborn, Decl., Doc. 393, at ¶ 31.

The BiOp estimated the effect of X2 on delta smelt abundance by using an updated version of the linear-additive model developed in Feyrer (2008). BiOp at 236. The result was Fig. E-22, which shows a linear relationship between X2 and delta smelt abundance such that juvenile abundance (which is measured using the Spring Tow-Net Survey) is equal to the sum of a constant number, plus the previous year's Fall Midwater Trawl Survey (times a constant number), minus X2 (times a constant number). BiOp at 268. Put simply, FWS' calculation found that A = B + C – D. Deriso Decl., Doc. 396, at ¶ 78.

Dr. Deriso explains the two fundamental problems with using an additive model. First, a linear additive model can produce the biologically implausible result that the total absence of adults in one year (i.e., no mature smelt to mate and lay eggs) could still result in the model indicating the presence of newborn smelt the next year. *Id.* at ¶ 80. As Dr. Deriso explains, this nonsensical result is the product of basic mathematical structure: if A (number of juveniles) = B

(constant) + C (adults) – D (Fall X2), then A can be positive even if C is zero, as long as B is larger than D. *See id.*

The second fundamental problem with a linear additive model is that it treats X2 as a purely "additive factor," meaning that an increase of X2 by one unit will always reduce the delta smelt population by a certain number, no matter how large or small the total population may be. *Id.* at ¶ 81. Dr. Deriso's critique implies that if changes in X2 are harmful to delta smelt, it is logical to expect that a change in X2 would affect a considerably higher absolute number of delta smelt in a population of 1,000,000 than in a population of 1,000. *See id.*

Use of a multiplicative stock-recruit model solves both of these deficiencies. *Id.* at ¶¶ 84-85. Multiplicative models are the textbook standard for modeling fish and other populations. *See* Deriso Decl., Doc. 396, at ¶ 43 n.3 (citing a representative sample of studies making use of multiplicative stock-recruit models); *see also, e.g.*, Bennett (2005) at 28-29 (using a multiplicative stock-recruit model for smelt abundance), AR 017031-017032; *see also* Hilborn Decl., Doc. 393, at ¶¶ 30-31. Multiplicative stock-recruit models are preferred because they can better reflect the biological realities and idiosyncrasies of the fish species of concern. *See* Deriso Decl., Doc. 396, at ¶ 83. This is because survival processes are inherently multiplicative: the fraction of individuals that survive to a

given age will naturally be the product of all of the previous daily survival rates since birth. *Id.* Dr. Hilborn opined that the linear additive "approach is totally inconsistent with accepted practice in population dynamics." Hilborn Decl., Doc. 393, at ¶ 30.

Plaintiffs point to several record documents critical of FWS's modeling approach. For example, several Plaintiffs sent comment letters recommending the use of a logarithmic model. *See* AR 006406. In addition, the Peer Review Panel expressed general concerns with the linear model, stating "the model may be inappropriate for the data being used." AR 008819.

FWS noted in the BiOp that although the regression model works for 56 percent of the data points, the residuals are "not normally distributed." BiOp at 236. FWS continued, "[t]he pattern of the residuals suggests that some type of transformation of the data would help to define a better fitting model (Figure E-22). This analysis did not explore different data transformations." *Id.* Plaintiffs maintain that "exploring" different data transformations would not require FWS to conduct independent studies or to develop any new types of mathematical models, but rather would only require plugging existing data into the standard model used by fisheries biologists throughout the world. *See* Deriso Decl. ¶ 89.

Federal Defendants respond that this critique is much ado

about nothing because, even though linear additive models can produce "biologically infeasible results" in some situations, the data set employed in the BiOp could not have created such a problem. *See* Newman Decl., Doc. 484, at ¶ 19 (explaining that "for the given range of FMWT index and X2 values, the model-fitted values remained positive" using the linear model). Dr. Newman opined that "linear models are often used as approximations to more realistic nonlinear models, and often over the range of covariate values of interest the nonlinear model may in fact be relatively linear." *Id.*

A court "may reject an agency's choice of a scientific model 'only when the model bears no rational relationship to the characteristics of the data to which it is applied." *NWF v. EPA*, 286 F.3d at 565; *see Nat'l Ass'n of Metal Finishers v. EPA*, 719 F.2d 624, 657 (3rd Cir. 1983) ("the choice of scientific data and statistical methodology to be used is best left to the sound discretion of the [agency]") *rev'd* on other grounds *sub nom.*, *Chem. Mfrs. Ass'n v. NRDC*, 470 U.S. 116 (1985).

Here, Plaintiffs critique raises a scientific dispute among experts. Dr. Newman's declaration provides evidence that the linear model used in the BiOp is not totally inappropriate. *See* Newman Decl., Doc. 484, at ¶ 19. It requires refinement, which FWS said it did. Newman's declaration also points out that the re-analysis by Dr. Deriso, using Deriso's model of choice, yields

a result that also exceeds the 0.05 threshold of statistical significance. *Id.*

Feyrer's 2007 analysis was published in a peer-reviewed scientific journal. Although the BiOp's Effect's Analysis Peer Review questioned the model, the reviewers did not recommend that the analysis or action be excluded; instead, that panel broadly supported implementation of the Fall X2 action, based in part on the analysis using the linear model, provided that the BiOp impose requirements for continued refinement of the analysis and implementation of the action by adaptive management. It is a close call. Absent agency bad faith, Plaintiffs have not established that this modeling dispute proves FWS violated the best available science standard.

c. DWR's Challenge to the BiOp's Choice of X2 Location.

RPA Component 3 (Action 4) requires the Projects to be operated to maintain X2 during the fall months at a location no greater than 74 km upstream from the Golden Gate Bridge following wet water years, and no greater than 81 km upstream following above normal water years. BiOp at 282-283. The rationale for this Component rests in large part on the Calsim II Dayflow comparison articulated in the Effects Analysis and discussed above. *See* BiOp 373-375, (explaining that the Effects section "clearly indicates there will be significant adverse impacts on X2"). As already determined, in the absence of calibration of

the two models, the Calsim II to Dayflow comparison has the potential to introduce significant, if not overwhelming, bias to the analysis that the BiOp nowhere discussed or corrected. The X2 action must be remanded to the agency for further consideration.

DWR also argues the X2 action is unlawful for a different reason, arguing that "[a]lthough the BiOp explains why Action 4 is to be implemented only in certain water year types, *see* BiOp 373-75, it fails completely to explain or justify the requirement that X2 be held at the locations specified." Doc. 548 at 9. Federal Defendants have not identified any record evidence that provides such an explanation. This total lack of explanation violates the APA's requirement that FWS "examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). This failure also violates FWS's own Consultation Handbook implementing the ESA, which requires: "When a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43. The BiOp violates this requirement because it fails to explain why it is essential to

maintain X2 at 74 km and 81 km, respectively, as opposed to any other specific location.

(4) Challenges to Turbidity Trigger.

In their opening brief, Plaintiffs argue that one of the underlying tenants of Component 1 -- the link between turbidity and smelt presence -- has been "revealed as wholly arbitrary and capricious." Doc. 551 at 29. Action 1 of RPA Component 1 is triggered when "first flush conditions" occur, which are demonstrated by elevated river inflow and turbidity. BiOp at 280-81. The BiOp claims turbidity is an appropriate "on-ramp" indicator for Action 1, because delta smelt presence and densities are correlated with turbid water, i.e., more delta smelt are found in turbid water than in clearer water, and so as turbid waters move towards CVP/SWP pumps, delta smelt must as well, which warrants severe pumping restrictions. *See* BiOp at 150-51, 280-81, 329-30.

Plaintiffs argue that after issuing the disputed BiOp and the RPA, FWS "recanted its confidence in the usefulness of turbidity as such an indicator" in a December 2009 "Interim Federal Action Plan for the California Bay-Delta" ("Federal Action Plan") to which FWS was a signatory. Doc. 551 at 29. That Federal Action Plan, which was attached to the Declaration

of Ronald Milligan[33] in Support of Federal Defendants' Opposition to Plaintiffs' Motion for Interim Remedy/Preliminary Injunction ("Milligan Decl."), Doc. 471, ¶ 11 & Exh. 3 at 10, contains the following discussion of a "2-Gates Fish Protection Demonstration Project":

> [The P]roject was proposed as a scientific experiment to test the hypotheses that delta smelt follow turbidity and that smelt entrainment at the pumps could be prevented by keeping turbid water away from the pumps.... Once in place, the gates would be operated to reduce turbidity near the State and Federal pumps, and an evaluation could then be made of whether turbidity is, in fact, an accurate predictor of the presence of smelt.

Id. (emphasis added). Plaintiffs complain that "FWS cannot simultaneously view turbidity as only a hypothetical indicator of delta smelt presence, and also as a scientifically defensible basis to develop an RPA with significant water costs. The two positions are fundamentally contradictory, resulting in an arbitrary RPA." Doc. 551 at 30.

Plaintiffs are mistaken. First, the turbidity indicator is not an automatic trigger for RPA Component 1:

> In order to prevent or minimize such entrainment, Action 1 shall be initiated on or after December 20 if the 3 day average turbidity at Prisoner's Point, Holland Cut, and Victoria Canal exceeds 12 NTU, or if there are three days of delta smelt salvage at either facility or if the cumulative daily salvage count is above the risk threshold based upon the 'daily salvage index' approach described in Attachment B.... <u>However, the SWG can recommend a delayed start or interruption</u>

[33] Mr. Milligan is the Manager of Reclamation's Central Valley Operations Office, with responsibility for the day to day operations of the CVP. Milligan Decl., Doc. 471, at ¶ 1.

based on conditions such as delta inflow that may affect vulnerability to entrainment.

BiOp at 281 (emphasis added).

FWS's reliance on turbidity as a potential indicator of smelt presence or movement was justified. The BiOp explains these physical conditions provide foraging, reproductive, and other behavioral and biological benefits to delta smelt. Turbid waters make it more difficult for delta smelt to be preyed upon, BiOp at 150-51, and also make it easier for delta smelt to forage for their prey, *id.* (citing 2004 study by Baskerville-Bridges). The preference of delta smelt for turbid waters has been verified in laboratory conditions with captive delta smelt, BiOp at 150 (citing a 2008 review by Nobriga and Herbold), and also in the field, where studies have observed "a negative correlation between the frequency of delta smelt occurrence in survey trawls during summer, fall and early winter and water clarity," *id.* (citing 2007 study by Feyrer and 2008 study by Nobriga). Increased turbidity is a documented indicator of improved habitat quality for delta smelt. Plaintiffs have provided any available science on the subject that was not considered. It was reasonable for the FWS to rely upon turbidity in RPA Component 1 as a potential predictor of delta smelt movement and adult delta smelt distribution.

The Federal Action Plan does not undermine this conclusion. As a threshold matter, the Plan is an extra-record document.

Even if it were part of the record, it does nothing to call the FWS's reliance on turbidity into question. The quote from the Plan relied upon by Plaintiffs describes the "2 Gates Fish Protection Demonstration Project," a forthcoming project designed to examine whether turbidity can be physically manipulated through barge-mounted gate structures, in an effort to keep delta smelt away from the influence of the pumps so that export pumping can be increased for the benefit of Plaintiffs and other agricultural concerns. Federal Action Plan at 10. The Action Plan will result in FWS and Reclamation continuing to study turbidity. *See* Federal Action Plan at 10-11 (announcing the publicly funded installation of an additional "14 real-time turbidity sensors in the Delta"). That further study is called for does not undermine the record evidence supporting the use of turbidity as an indicator.

Plaintiffs do not address the turbidity trigger in their reply brief. Federal Defendants reliance on turbidity as one of several triggers for Action 1 was not arbitrary and capricious.

(5) Challenges to the Incidental Take Limit/Selective Use of Data.

Plaintiffs maintain Federal Defendants' failed to use the best available scientific data by selectively excluding data from certain parts of the BiOp, while including that data in other sections for different purposes. In particular, Plaintiffs

maintain that such selective use of data tainted: (1) the analysis of the effects of OMR flows on delta smelt; and (2) the formulation of the incidental take statement.[34]

a. FWS's Exclusion of Certain Data Points When Analyzing Entrainment.

On the impact of negative OMR flows on entrainment, the BiOp relies on a plot of the total number of salvaged adult delta smelt against OMR flows for the period from 1984 to 2007, BiOp at 164 (Figure S-8), and uses this plot to support the conclusion that entrainment of adult delta smelt rises with increasingly negative OMR flows, *see* BiOp at 164-65, 348-49. It is also undisputed that FWS eliminated certain data from that plot, excluding data from the years 1987, 1989, 1990, 1991, 1992 and 2007 because "low turbidity conditions" existed in Clifton Court Forebay. BiOp at 164.

This is explained in the graph itself. *Id.* (1987, 1989-92, 1994, and 2007 were excluded because those years exhibited low (<12ntu) average water turbidity during Jan-Feb at Clifton Court Forebay). The BiOp explains that turbidity is a potential indicator of smelt presence or movement. BiOp at 151. The BiOp presents defensible grounds for excluding these data points;

[34] The opening paragraph of the section of Plaintiffs' motion for summary judgment addressing the selective use of data also asserts that this practice tainted the BiOp's justification for monthly flow requirements under RPA Action 4 and examination of the effects to the species of exports of Article 21 water by the SWP. Doc. 551 at 25. However, these two additional arguments were not discussed or supported in the text of Plaintiffs motion. They will not be addressed.

Plaintiffs do not provide any evidence suggesting these exclusions were scientifically improper. There is no independent legal reason why FWS should be precluded from excluding certain data points if scientifically justified.

Under its mandate to utilize the best available science, FWS "cannot ignore available, relevant biological information." *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988); *Kandra v. United States*, 145 F. Supp. 2d 1192, 1208 (D. Or. 2001). Plaintiffs cite *Sierra Club v. EPA*, 346 F.3d 955, 961 (9th Cir. 2003), for the proposition: "[t]he inclusion of data for one purpose and the exclusion of the same data for another, intimately related, purpose is impermissible" and "violates the best available science standard." Doc. 551 at 27. *Sierra Club* does not stand for such a proposition. The *Sierra Club* plaintiffs challenged EPA's conclusion under the Clean Air Act that exceedences of air pollution standards on two particular days in Imperial County, California were caused by transborder emissions from Mexico. 346 F.3d at 959-60. The Ninth Circuit recognized that "where, as here, a court reviews an agency action 'involv[ing] primarily issues of fact,' and where 'analysis of the relevant documents requires a high level of technical expertise,' we must 'defer to the informed discretion of the responsible federal agencies.'" *Id*. at 961 (quoting *Marsh,* 490 U.S. at 377). Such deference was not owed where the agency

decision "is without substantial basis in fact." *Id.* EPA's decision was vacated after plaintiffs presented uncontested evidence, based on wind data, that the pollution at issue was not caused by transborder emissions. *Id.* at 961-62. Nowhere did the Ninth Circuit discuss or find that EPA included data for one purpose while excluding it for some other related purpose, nor did it evaluate or even mention the ESA's best available science standard. Plaintiffs' argument is without legal or factual support.

b. FWS's Use of Data to Examine the Relationship Between OMR Flows and Salvage and Exclusion of that Data from the Incidental Take Limit Analysis.

Plaintiffs next argue that FWS acted unlawfully by selectively using certain data when examining, the relationship between negative OMR flows and entrainment while excluding that same data from the calculation of the incidental take limit.

Where FWS concludes that "an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2) ... the Service will provide with the biological opinion a statement concerning incidental take." 50 C.F.R. § 402.14(i)(1); *see also* 16 U.S.C. § 1536(b)(4); BiOp at 285-93. The Incidental Take Statement ("ITS") provides an exemption from the take prohibitions of ESA section 9 when the agency can demonstrate compliance with its terms and conditions.

Consultation Handbook 4-47. It "specifies the impact, i.e., the amount or extent, of such incidental taking on the species," with an estimate of the number of individuals reasonably likely to be taken with full implementation of the RPA.[35] 50 C.F.R. § 402.14(i)(1)(i); Consultation Handbook 4-50.

The Consultation Handbook enumerates three criteria for ITS take: (1) the take must not be likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) it must result from an otherwise lawful activity; and (3) it must be incidental to the purpose of the action. Consultation Handbook 4-48. An agency action can meet the first criterion if the RPA eliminates the likelihood of jeopardy to the species or adverse modification of designated critical habitat. *Id.* If FWS determines that full implementation of the RPA is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat, the ITS is its estimate of the number of individuals

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[35] Federal Defendants note that there is no requirement that an ITS identify an anticipated number of listed species to be taken. *See Ariz. Cattle Growers,* 273 F.3d at 1249 ("We have never held that a numerical limit is required"); *Pacific Nw. Generating Coop. ("PNGC") v. Brown*, 822 F. Supp. 1479, 1510 (D. Or. 1993), aff'd, 38 F.3d 1058 (9th Cir. 1994). In rejecting such an argument in PNGC, the District of Oregon cited legislative history that "demonstrates that Congress fully anticipated that there would be occasions when impacts would have to be estimated." *Id.* (citing S. Rep. No. 97-418, 97th Cong.2d Sess. 21 (1982), U.S.C.C.A.N. 1982, p. 2807 (take specification not a "quota" requirement)). The court also noted that other legislative history stated, "The Committee ... does not intend that the Secretary will, in every instance, interpret the word 'impact' to be a precise number...For example, it may not be possible to determine the number of eggs of an endangered or threatened fish which will be sucked into a power plant ...." *Id.* (citing H.R. Rep. No. 97-567, 97th Cong., 2d Sess. 27 (1982), U.S.C.C.A.N. 1982, p. 2827)).

which will be taken once the RPA is implemented. If this number is exceeded, the agency must immediately reinitiate consultation with FWS. 50 C.F.R. § 402.14(i)(4).

FWS provided an ITS in the BiOp that sets forth the anticipated level of take that will occur as a result of CVP/SWP operations under the RPA. The BiOp employs an adaptive approach that utilizes a formula to compute the take limit each year using the prior Fall Midwater Trawl Index. BiOp at 287, 383-86. The ITS provides separate estimates of the amount of take anticipated for adult and larval/juvenile life stages of delta smelt upon full implementation of the RPA. *Id.*

BiOp Appendix C explains the methods FWS used to determine adult and juvenile take. To estimate the amount of take, FWS approximated salvage that would be expected under similar conditions, based upon recent historic data from the export salvage facilities.[36] Goude Decl., Doc. 470, at ¶ 14. As Ms. Goude explains, the procedure FWS used yields a discrete value for take as salvage so that the adaptive process can operate

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[36] Ms. Goude explains in her declaration that the actual number of fish "salvaged" -- that is, recovered and counted at the export facility fish screens -- is a small proportion of those actually lost due to CVP/SWP operations. Goude Decl., Doc. 470, at ¶ 16. Pre-screen losses (e.g., those that occur as they enter the structures of the export salvage facilities) can account for additional sources of mortality that remain uncounted, but have been shown to be significant for delta smelt and salmonids. *See* BiOp at 209. Also, delta smelt smaller than 20mm long are not counted in salvage counts, thus significant, uncounted losses of juveniles can occur. Goude Decl., Doc. 470, at ¶ 16. For these reasons, salvage is not a completely accurate measure of actual project take via entrainment. *Id.*

relative to an estimate of the absolute number of fish extant in the system. *Id.* at ¶ 15. The calculation of incidental take varies by year under this methodology, depending on the previous year's FMWT index. This allows take to increase as delta smelt abundance increases. *Id.* Conversely, when the FMWT index is low, the permissible level of take is also reduced. *Id.*

The BiOp sets an incidental take limit for pre-spawning adult delta smelt based on "[t]he average [cumulative salvage index] value for [water years] 2006 to 2008...." BiOp at 287. According to FWS, the years 2006, 2007 and 2008 data were selected because "these years within the historic dataset best approximate expected salvage under RPA Component 1." *Id.* In contrast, FWS relied on a graph that excluded data from 2007 when it analyzed the related "OMR-Salvage relationship for adult delta smelt" which underlies RPA Component 1 and the Project Effects Analysis. BiOp at 348. Plaintiffs argue that "the 2007 data should have been included in the above-described analyses or excluded from both." Doc. 551 at 27. Plaintiffs point out that the inclusion of the 2007 data in calculating the incidental take limit lowered the average cumulative salvage index value and, the take limit ultimately imposed. *See* Deriso Decl., Doc. 396, at ¶ 99 (explaining that exclusion of the 2007 data increased the take coefficient from 7.25 to 10.45). Plaintiffs maintain that FWS unjustifiably included 2005 data in setting the juvenile take

limit, but excluded the data in setting the adult take limit.

The BiOp explains why these years were used. In estimating conditions under which take would occur, FWS initially restricted itself to those years where active adaptive management was used to reduce entrainment and salvage was similar to that expected by RPA operations. *See* BiOp 385-86. Only two years are comparable to this scenario, 2007 and 2008. In order to increase sample size for what FWS knew was a rough estimate, the BiOp utilized the range 2006 to 2008 for adult smelt entrainment, and 2005-2008 for juvenile smelt entrainment. Goude Decl., Doc. 470, at ¶ 14; *see* BiOp at 382-96.

Plaintiffs rejoin that "[i]t was per se unreasonable for FWS to make use of the 2007 salvage data in calculating the ITS because it "best approximate[d] expected salvage under RPA Component 1," after earlier rejecting the same data for Fig. B-13 because it was unrepresentative of salvage trends, and thus could not be used to calculate the OMR flow limits for RPA Component 1." Doc. 697 at 43.

However, such data was used for an entirely different purpose in these two scenarios. Figure B-13 was applied to examine the point at which negative OMR flows posed an unacceptable danger to the smelt. It was premised on a data set of more than 20 years. It was reasonable under those circumstances to exclude data that accounted for confounding

factors, such as turbidity. FWS determined that the best way to calculate the ITS (which seeks to estimate take levels that will occur if the RPA Actions are implemented) was to look at years in which flow restrictions similar to those imposed by the RPA Actions were in place. This data set was far smaller, arguably justifying the inclusion of 2007.

Plaintiffs' argument that 2007 should have been treated as an "outlier" for purposes of the ITS is not accurate. As Federal Defendants explain:

> [D]ata from 2007 [] is, in actuality, data from conditions similar to those under the RPA – where there was salvage under adaptive management to reduce entrainment. Goude Decl. at ¶ 14. The estimates contained in the ITS are intended to reflect operations during a full range of year-types, not just those years when smelt entrainment is highest.

Doc. 660 at 53-54.

Plaintiffs' assertion that the sample size of years was too small presents a scientific dispute. In preparing the ITS, FWS selected years for inclusion to replicate expected operations under the RPA. BiOp at 287. Due to limited data, FWS exercised scientific discretion to select the "most appropriate" years to estimate the level of incidental take.

As to the inclusion of 2005 in the calculation for the juvenile take limit, but not in the adult take limit, the BiOp states:

> The mean values from 2005-2008 were used as an estimate of take under the RPA. The reason for selecting this span of years is that the apparent abundance of delta

> smelt since 2005 as indexed by the 20-mm Survey and the TNS is the lowest on record. It was necessary to separate out this abundance variable, but also to account for other poorly understood factors relating salvage to OMR, distribution, and the extant conditions....

BiOp at 289. Federal Defendants also attempt to provide an explanation based on the record:

> [T]he Service explained the separate treatment of juveniles and adults, noting that "individuals of the larval/juvenile lifestage are less demographically significant than adults." BiOp at 289. Plaintiffs acknowledge – but dismiss – the biological justification that the Service provided for considering 2005 for juveniles: "the apparent abundance of delta smelt since 2005 ... is the lowest on record." BiOp at 289. Based on information from the summer townet survey and the 20mm Survey, it was reasonable for the Service to include the 2005 juvenile data in its computations. BiOp at 392.

Doc. 660 at 53. These justifications do not explain why the approach used to select the years for the adult ITS (years in which conditions mimicked those under the RPA) was abandoned for criteria based upon low smelt abundance. FWS has not provided a rational explanation for this aspect of the ITS.

Plaintiffs argue the 2006 data point should be excluded from the ITS calculation for larval/juvenile smelt, because that year was "one of only three years in the entire multi-decade sample in which OMR flow was positive, resulting in almost zero salvage. *See* BiOp at 254." Doc. 551 at 32 (noting that the juvenile salvage index was 0.4 in 2006, compared with values of 23.4 for 2005, 65.1 for 2007, and 60.9 for 2008). Plaintiffs argue that the use of the 2006 data point to calculate the larval/juvenile

ITS was unreasonable because it was entirely unrepresentative of normal salvage levels. Plaintiffs also point out that removing unrepresentative data points "significantly increases the take level." Deriso Decl., Doc. 396, at ¶ 105. Federal Defendants do not address this potential flaw in the logic underlying the juvenile/larval ITS. Because the juvenile/larval ITS must be remanded on other grounds, FWS should explain why 2006 was included.

c. DWR's Additional Challenges the ITS.

DWR contends the ITS is flawed because it depends on the average cumulative salvage index of the years selected. Because the incidental take estimate is based on an average, there is theoretically a 50% chance each year that the estimate will be exceeded, and a corresponding 50% chance that the agency will have to reinitiate the consultation. Doc. 548 at 11-12. The estimate would have been exceeded in two of the three years used to calculate it.

The record does not explain why an "averaging" approach was used. As part of the process of formulating the ITS, FWS generated a "Concern Level" estimate, "meant to indicate salvage levels approaching the take threshold." BiOp at 387. FWS expressed its "belief" that the "Concern Level" should "trigger at 75 percent of the adult incidental take, as an indicator that operations need to be more constrained to avoid exceeding the

incidental take." *Id.* This means the ITS is not only a threshold used to trigger reconsultation; it also functions as an action that influences operations under the RPA.

Based on known adverse water supply consequences of operating the Projects in a "constrained" manner, it is inexplicable that FWS did not provide a clear and rational explanation of how the ITS is set. A court, "cannot infer an agency's reasoning from mere silence," and "an agency's action must be upheld, if at all, on the basis articulated by the agency." *See PCFFA*, 426 F.3d at 1091. Because no such explanation or basis is provided, the entire ITS must be remanded for the required justifying explanation.

DWR further maintains that the BiOp incorrectly calculated the number of years in which the incidental take limit was historically violated. The BiOp states that the take estimate would be exceeded only five out of the fifteen years between 1993 and 2008. BiOp at 386. This conclusion results from an error. BiOp Table C-1, calculating the number of years the take estimate was exceeded, actually shows that this threshold would be exceeded not only in the five identified years, but in six more years, including two of the years (2006 and 2008) that FWS believes best approximate the future with the RPA fully implemented, a total of eleven out of the sixteen years. *Id.* FWS must correct these errors on remand.

(6) Challenges to the BiOp's Analysis of the Hydrodynamic Effects of the Projects.

Plaintiffs next challenge the BiOp's Project Effects Analysis as unlawful, because it: (1) bases the analysis of effects of Project Operations on the improper assumption that such operations "control" or "drive" hydrodynamic conditions in the Delta, and (2) then determines, relying on this assumption, that because CVP and SWP operations drive the hydrodynamic conditions in the Delta, those operations are the indirect cause of harm to delta smelt; when in truth a multitude of other causes ranging from predation to the adverse effects associated with invasive species contribute to the delta smelt's currently low population levels.

The BiOp explains:

> **[There are a] multitude of factors that affect delta smelt population dynamics including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and microcystis. The extent to which these factors adversely affect delta smelt is related to hydrodynamic conditions in the Delta, which in turn are controlled to a large extent by CVP and SWP operations. . . . So while many of the other stressors that have been identified as adversely affecting delta smelt were not caused by CVP and SWP operations, the likelihood and extent to which they adversely affect delta smelt is highly influenced by how the CVP/SWP are operated in the context of annual and seasonal hydrologic conditions. While research indicates that there is no single primary driver of delta smelt population dynamics, hydrodynamic conditions driven or influenced by CVP/SWP operations in turn influence the dynamics of delta smelt interaction with these other stressors (Bennett and Moyle 1996).**

BiOp at 202. Plaintiffs take issue with the logic and science of this opinion, asserting: (1) in reality, Project Operations do not "control" or "drive" hydrodynamic conditions in the Delta; and (2) hydrodynamic conditions in the Delta do not exert a "high degree of influence" over the other stressors on delta smelt and its habitat, which operate independently.

a. Project Operations as a Driver of Hydrodynamic Conditions in the Delta.

Plaintiffs complain that the BiOp "simply assumed that Project Operations drive hydrodynamics thereby exacerbating the effects of other causes of harm on the delta smelt," although the contrary is established by the record. Doc. 551 at 53. Plaintiffs maintain that Project Operations do not control precipitation patterns, which are the real drivers of inflow to the Delta watershed. *Id.*[37]

CALFED scientists concluded in a 2008 Report:

> Despite California's extensive system of water storage

[37] In a related argument, Plaintiffs challenge the BiOp's conclusion that the long-term upstream shift in the position of X2 was driven by Project Operations. Plaintiffs insist that the premise that Project operations drive hydrodynamic conditions in the Delta is unsupported by the record and best available science. Rather, they insist historic change in X2 was primarily driven by non-Project causes. Doc. 697 at 38. The majority of evidence provided by Plaintiffs in support of this argument, cited in their Reply brief, is inadmissible on summary judgment. For example, Plaintiff's cite paragraph 5 of the Reply Declaration of Dr. Charles Hanson, Doc. 598, which was stricken from the record, *see* Doc. 750 at ¶ 10. Plaintiffs also cite extensively to the transcript from the evidentiary hearing on the motion for preliminary injunction. Plaintiffs have provided no authority that the testimony of witnesses at a post-record hearing is admissible under any of the exceptions to the general rule prohibiting consideration of extra-record evidence, except to explain scientific matter and to determine if the information was considered by the agency.

> and flow management, there is growing evidence that our capacity to manage water supply and water quality is limited. For example, there is no getting around the fact that natural patterns of precipitation and runoff drive Central Valley hydrology, and that the salinities found in the Bay- Delta are driven as much by natural climate variability as they are by freshwater management (Knowles 2002).

CALFED Science Program, The State of Bay-Delta Science 2008 42-43 (2008), Doc. 199 ("State of Bay-Delta Science").[38] Similarly, Dr. Kimmerer has stated:

> Freshwater supply to the San Francisco Estuary depends on highly variable precipitation patterns and the effects of extensive water development projects upstream and within the Delta....
>
> ***
>
> Given the extent and magnitude of the water projects, it may seem paradoxical that most of the interannual variability in flow patterns in the estuary is due to variability in precipitation.

Wim J. Kimmerer, Open Water Processes of the San Francisco Estuary: From Physical Forcing to Biological Responses, 2(1) San Francisco Estuary & Watershed Science 15 (2004), AR 18717-18718. Indeed, precipitation patterns are highly variable. *See* State of Bay-Delta Science at 40-42 ("precipitation patterns are highly variable from year to year (inter-annually) and within years (seasonally)"). As a result, "[f]reshwater input to the estuary is highly variable on all time scales." Wim J. Kimmerer et al.,

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[38] Plaintiffs motion to supplement the record with this document was granted in part, allowing Plaintiffs to reference the document and the Court to consider the document under the relevant factors exception to the administrative record doctrine. Doc. 406 at 4.

Variation of Physical Habitat for Estuarine Nekton with Freshwater Flow in the San Francisco Estuary (May 15, 2008), AR 019016; *see also* Public Policy Institute of California, Envisioning Futures for the Sacramento-San Joaquin Delta 102 (2007) (stating that inflows to the Delta "vary greatly across seasons and years"), AR 019343.

The first paragraph of the Effects analysis states that "hydrodynamic conditions in the Delta... are controlled to a large extent by CVP and SWP [pumping] operations," and that other sources of water diversion "when taken together do not control hydrodynamic conditions throughout the Delta to any degree that approaches the influence of the Banks and Jones export facilities." BiOp at 202. This apparent inconsistency with the science must be considered in light of the BiOp's next page, which explains that "every day the system is in balanced conditions, the CVP and SWP are [] primary driver[s] of delta smelt abiotic and biotic habitat suitability, health, and mortality." BiOp at 203. The BiOp does not assume that pumping operations continuously drive hydrodynamic conditions; rather, Project operations primarily drive hydrodynamic conditions when the system is in balance.[39] With this qualification, the studies

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[39] **The BiOp explains: "Balanced water conditions are defined in the COA as periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flows approximately equal[] the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is mutually agreed that releases from upstream reservoirs plus**

cited by Plaintiffs do not conflict with the BiOp.

The scientific literature does a side-by-side analysis. Kimmerer (2004) finds that "most of the interannual variability in flow patterns in the estuary is due to variability in precipitation ... due to the overwhelming effect of high flow events." AR 18718. He describes the following impacts of the CVP-SWP:

> The water projects have clearly affected the seasonal patterns of flow into the estuary (Kimmerer 2002b). Springtime flow has decreased significantly relative to unimpaired flow because of shifts in water project operations each year from flood management in winter, during which reservoirs are kept at relatively low levels, to water storage in spring, when much of the flow is captured for subsequent irrigation. In addition, flow in summer and early fall is higher than unimpaired flow to support demand for irrigation and urban use, much of which is met by releases from reservoirs into the rivers and subsequent recapture and export from the Delta (Arthur et al. 1996).

Id. While the CALFED report observes that "natural patterns of precipitation and runoff drive Central Valley hydrology," it also finds that "[r]ecent examination of the impacts of water project development in the state has documented species population losses

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unregulated flow exceed Sacramento Valley in-basin uses plus exports. Reclamation's Central Valley Operations Office (CVOO) and DWR's SWP Operations Control Office jointly decide when balanced or excess water conditions exist." BiOp at 19.

"The duration of balanced water conditions varies from year to year. Some very wet years have had no periods of balanced conditions, while very dry years may have had long continuous periods of balanced conditions, and still other years may have had several periods of balanced conditions interspersed with excess water conditions. Account balances continue from one balanced water condition through the excess water condition and into the next balanced water condition. When the project that is owed water enters into flood control operations, at Shasta or Oroville, the accounting is zeroed out for that respective project. The biological assessment provides a detailed description of the changes in the COA." BiOp at 20-21.

due to destruction of habitat, alteration of flow timing and changes in water chemistry, water velocities and runoff quantities." Doc. 199-4 at 15.

The BiOp recognizes that "delta smelt abundance trends have been driven by multiple factors, some of which are affected or controlled by CVP/SWP operations and others that are not. Notably, the BiOp acknowledges the decline of delta smelt cannot be explained solely by the effects of CVP/SWP operations." BiOp at 203. The BiOp's conclusions about the cause and effect of other stressors are ambiguous. Plaintiffs' quest for precision in delinking Project operations as the primary driver of smelt decline is understandable in view of the ambiguity of the BiOp.

b. Treatment of Other Stressors.

Plaintiffs complain that the BiOp attributes a wide variety of causes of harm to delta smelt and its habitat—such as aquatic macrophytes, predators, competition, toxic blue-green algae, and contaminants—to continued Project Operations, without any meaningful explanation. *See* BiOp at 182-188, 202-203.

The BiOp concludes:

> Other baseline stressors will continue to adversely affect the delta smelt, such as contaminants, microcystis, aquatic macrophytes, and invasive species. Available information is inconclusive regarding the extent, magnitude and pathways by which delta smelt may be affected by these stressors independent of CVP/SWP operations. However, the operation of the CVP/SWP, as proposed, is likely to reduce or preclude seasonal flushing flows, substantially reduce the natural frequency of upstream and downstream movement of the

> **LSZ, and lengthen upstream shifts of the LSZ to an extent that may increase the magnitude and frequency of adverse effects to the delta smelt from these stressors.**

BiOp at 277.

Plaintiffs argue that the BiOp makes no rational connection between the other causes of harm to the smelt and their habitat and continued Project Operations.[40] Plaintiffs acknowledge that the BiOp contains some discussion of various causes of harm to delta smelt and their habitat other than from Project Operations, BiOp at 182-188, but complain that the BiOp "does not quantitatively (or even qualitatively) explain the [independent] impact that these causes of harm to the species and its habitat have on the size of the delta smelt population, nor to the ostensible ecological pathways by which these environmental stressors affect the fish." Doc. 551 at 56-57.

Plaintiffs argue that the BiOp's treatment of other stressors conflicts with a "consensus that has emerged over the last several years in the scientific community that there are a host of causes of harm to the species that collectively have

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[40] Specifically, Plaintiffs maintain that, to comply with the law, FWS must "(1) analyze the effect that other causes of harm have on the delta smelt and its habitat; (2) analyze the extent to which hydrodynamics contribute to each of those other causes of harm to the species and its habitat; (3) analyze the extent to which Project Operations—as distinguished from the other operations that result in the diversion of most of the water from the Delta's watershed—influence hydrodynamics in the Delta watershed; and (4) assess the extent of harm attributable to other causes that can be traced to Project Operations in light of such an analysis." Doc. 551 at 56. Plaintiffs point to no statute, regulation, or caselaw that imposes such specific requirements. Nonetheless, the BiOp must establish a rational connection between the facts and its conclusion that Project Operations exacerbate the impacts of other stressors.

contributed to its decline." *Id.* at 57. Plaintiffs point to a 2007 Public Policy Institute of California Report entitled "Envisioning Futures for the Sacramento-San Joaquin Delta" by Jay Lund, et al., which discusses how "[s]everal basic assumptions on how the [Sacramento-San Joaquin] estuary operates have proven to be incorrect or only partially correct." AR 19303. The PPIC report describes these revised understandings as a set of "paradigm shifts" in Table 4.1, reproduced in substance below:

Table 4.1
New Understanding of the Delta Ecosystem

New Paradigm	Old Paradigm
1. **Uniqueness of the San Francisco Estuary** The San Francisco Estuary has complex tidal hydrodynamics and hydrology. Daily tidal mixing has more influence on the ecology of the estuary than riverine outflows, especially in the western and central Delta. Conditions that benefit striped bass (an East Coast species) do not necessarily benefit native organisms.	The San Francisco Estuary works on the predictable model of East Coast estuaries with gradients of temperature and salinity controlled by outflow. Freshwater outflow is the most important hydrodynamic force. If the estuary is managed for striped bass, all other organisms, and especially other fish, will benefit.
2. **Invasive Species** Alien species are a major and growing problem that significantly inhibits our ability to manage in support of desirable species.	Alien (nonnative) species are a minor problem or provide more benefits than problems.
3. **Interdependence** Changes in management of one part of the system affect other parts. All are part of the estuary and can change states in response to outflow and climatic conditions. Floodplains are of major ecological importance and affect estuarine function. Suisun Marsh is an integral part of the estuary ecosystem and its future is closely tied to that of the Delta.	The major parts of San Francisco Estuary can be managed independently of one another. The Delta is a freshwater system, Suisun Bay and Marsh are a brackish water system, and San Francisco Bay is a marine system. Floodplains such as the Yolo Bypass have little ecological importance. Suisun Marsh is independent of the rest of the estuary

4. **Stability** The Delta will undergo dramatic changes in the next 50 years as its levees fail because of natural and human-caused forces such as sea level rise, flooding, climate, and subsidence. A Delta ecosystem will still exist, with some changes benefiting native species. Agriculture is unsustainable in some parts of the Delta.	The Delta is a stable geographic entity in its present configuration. Levees can maintain the Delta as it is. Any change in the Delta will destroy its ecosystem. Agriculture is the best use for most Delta lands.
5. **Effects of Human Activities** Pumping in the Delta is an important source of fish mortality but only one of several causes of fish declines. Entrainment of fish at the power plants is potentially a major source of mortality. Changes in ocean conditions (El Niño events, Pacific Decadal Oscillation, ocean fishing, etc.) have major effects on the Delta. Hatcheries harm wild salmon and steelhead. Chronic toxicants continue to be a problem, and episodic toxic events from urban and agricultural applications are also a major problem.	Pumping in the southern Delta is the biggest cause of fish declines in the estuary. Fish entrainment at power plants is a minor problem. Changes in ocean conditions have no effect on the Delta. Hatcheries have a positive or no effect on wild populations of salmon and steelhead. Chronic toxicants (e.g., heavy metals, persistent pesticides) are the major problems with toxic compounds in the estuary.

AR 19305-306. The fifth paradigm shift finds that Delta Pumping is an "important source of fish mortality but only one of several causes of fish declines." AR 019306. This finding is further supported by the Interagency Ecological Program's conceptual model that describes observed pelagic fish declines in the Delta and recognizes numerous sources of harm to the species including contaminants, disease, toxic algal blooms, climate change, predation, entrainment in diversions, and limited food availability, limited food co-occurrence with the species, and poor food quality. *See* Randall Baxter et al., Pelagic Organism Decline Progress Report: 2007 Synthesis of Results (2008) AR 16935-53. In light of this general, undisputed consensus that many factors contribute to delta smelt mortality, Plaintiffs challenge the BiOp's attribution to the Projects of the effects

of: (1) predation; (2) aquatic macrophytes; and (3) microcystis.

(1) Predation Analysis.

Plaintiffs describe the BiOp's predation as a purportedly flawed attribution of another stressor to Project Operations. The BiOp generally acknowledges that striped bass prey on the delta smelt but concludes that "[i]t is unknown whether incidental predation by striped bass (and other lesser predators) represents a substantial source of mortality for delta smelt." BiOp at 183. The BiOp does not include any estimates of the effect of predation on the delta smelt population. Such information was available. The Conservation Plan for DFG's Striped Bass Management Program ("Conservation Plan"), which was submitted to FWS as part of an application for an incidental take permit, states: "[d]espite the low incidence of delta smelt in striped bass stomachs, the year-round overlap in distribution of delta smelt and striped bass results in an estimated annual consumption of about 5.3% of the delta smelt population by a striped bass population of approximately 765,000 adults." Doc. 181-1 at 32 (emphasis added).) The Conservation Plan explains that FWS and DFG "have agreed that a predation rate of 5.3% of the annual delta smelt population is a reasonable estimate." *Id.* at 33. FWS issued an incidental take permit to DFG on the basis of this striped bass predation estimate. There is question whether this underestimates the effect on delta smelt of bass

predation. *See* First Amended Complaint, *Coalition v. McCamman*, 1:08-cv-00397 OWW GSA, Doc. 46.

FWS need not include every piece of available information regarding other stressors in the BiOp. *Kempthorne*, 506 F. Supp. 2d at 367 ("If FWS was required to consider and address every new piece of information it received prior to publication of its decision, it would be effectively impossible for the agency to complete a biological opinion."). However, FWS cannot ignore relevant information pertaining to a major source of mortality to the species, particularly when that information is decidedly contrary to BiOp findings. It is not clear from the record whether 5.6% mortality should be considered significant. In related contexts, mortality of 1% has been used as an incidental take limit, *see* Findings of Fact and Conclusions of Law Re Existence of Irreparable Harm, *PCFFA v. Gutierrez*, 1:06-cv-00245 OWW GSA, Doc. 367 at 48:5-9 (noting that incidental take limit for winter-run Chinook salmon is set at two percent of the estimated number of juveniles produced each year), suggesting that such small percentages may be significant enough to merit discussion. The 5.3% figure may be partially attributable to Project operations. As the BiOp explains, there are high rates of predation in Clifton Court Forebay, BiOp 160-161, 209, but the contribution of striped bass predation to this mortality is not articulated. The BiOp erroneously failed to consider available

information regarding the magnitude of striped bass predation on delta smelt, with the likely result of erroneously attributing to the Projects, impacts independent of Project Operations.

(2) Aquatic Macrophytes.

The BiOp discusses aquatic macrophytes:

> In the last two decades, the interior Delta has been extensively colonized by submerged aquatic vegetation. The dominant submerged aquatic vegetation is Egeria densa, a nonnative from South America that thrives under warm water conditions. Research suggests that *Egeria densa* has altered fish community dynamics in the Delta, including increasing habitat for centrarchid fishes including largemouth bass (Nobriga et al. 2005; Brown and Michniuk 2007), reducing habitat for native fishes (Brown 2003; Nobriga et al. 2005; Brown and Michniuk 2007), and supporting a food web pathway for centrarchids and other littoral fishes (Grimaldo et al in review). *Egeria densa* has increased its surface area coverage by up to 10 percent per year depending on hydrologic conditions and water temperature (Erin Hestir personal communication University of California Davis).
>
> *Egeria densa* and other non-native submerged aquatic vegetation (e.g., *Myriophyllum spicatum*) can affect delta smelt in direct and indirect ways. Directly, submerged aquatic vegetation can overwhelm littoral habitats (inter-tidal shoals and beaches) where delta smelt may spawn making them unsuitable for spawning. Indirectly, submerged aquatic vegetation decreases turbidity (by trapping suspended sediment) which has contributed to a decrease in both juvenile and adult smelt habitat. Increased water transparency may delay feeding and may also make delta smelt more susceptible to predation pressure.

BiOp at 182-183. General discussions of *Egeria densa* are included in the Critical Habitat section of the BiOp. BiOp at 196, 198, 201. Discussion of PCE # 2 explains:

> As stated in the Status and Baseline Section, research

> suggests that the nonnative South American aquatic plant *Egeria densa* has altered fish community dynamics in the Delta. In addition to the above-mentioned effect of overwhelming spawning habitat (PCE #1), *Egeria* and other submerged aquatic vegetation decreases turbidity by trapping suspended sediment, thereby decreasing juvenile and adult smelt habitat (Feyrer et al. 2007; Nobriga et al. 2008). Increased water transparency may also make delta smelt more susceptible to predation. It appears that aquatic macrophytes may have a role in degrading pelagic habitat to the extent that the Delta's ability to fulfill its intended conservation purpose continues to diminish. *Egeria* has the additional effect of decreasing turbidity, described above as important to successful feeding of newly-hatched larval delta smelt. However, there is still enough turbidity in the Central and South Delta to initiate larval feeding responses because larvae collected in the South Delta have comparatively high growth rates. So while *Egeria* may reduce or eliminate the extent and quality of spawning habitat for delta smelt, it is not at this considered to have detectable effects on spawning or early feeding success.

BiOp at 198.

The BiOp concludes:

> Available information is inconclusive regarding the extent, magnitude and pathways by which delta smelt may be affected by these stressors independent of CVP/SWP operations. However, the operation of the CVP/SWP, as proposed, is likely to reduce or preclude seasonal flushing flows, substantially reduce the natural frequency of upstream and downstream movement of the LSZ, and lengthen upstream shifts of the LSZ to an extent that may increase the magnitude and frequency of adverse effects to the delta smelt from these stressors.

BiOp at 277. Although a connection may exist, the record does not reflect any discussion, nor have the parties pointed to any study, connecting "seasonal flushing flows ... the natural frequency of upstream and downstream movement of the LSZ, and

lengthen[ed] upstream shifts of the LSZ" to the presence of any aquatic macrophyte. FWS has failed to make a rational connection between the facts in the record and its conclusions, particularly when the science indicates the contrary is likely true.

(3) Microcystis

FWS makes no connection whatsoever between microcystis, large blooms of toxic blue-green algae, and continued CVP and SWP operations. *See* BiOp at 186. In a discussion regarding the Vernalis Adaptive Management Plan (VAMP) period,[41] FWS stated:

> Without the flow component, the larval and juvenile delta smelt would remain in the Central and South Delta, where they could be exposed to lethal water temperatures, entrainment at Banks and Jones after the VAMP export curtailment period, or succumb to predation or microcystis blooms.

BiOp at 224. The BiOp does not analyze the effect that this asserted increased exposure to other stressors has on the delta smelt, or how it is caused by Project Operations; rather, FWS simply concludes without support that this effect buttresses a determination that the proposed action will jeopardize the delta smelt.

It is undisputed that numerous stressors, including ammonia

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[41] "Adopted by the SWRCB in D-1641, the San Joaquin River Agreement (SJRA) includes a 12-year program providing for flows and exports in the lower San Joaquin River during a 31-day pulse flow period during April and May. It also provides for the collection of experimental data during that time to further the understanding of the effects of flows, exports, and the barrier at the head of Old River on salmon survival. This experimental program is commonly referred to as the VAMP (Vernalis Adaptive Management Plan)." BiOp at 78.

and other toxics, food limitation, predation, the introduction of non-native species and other factors, all have adverse impacts to delta smelt. *See e.g.*, BiOp at 182-84 (discussing other stressors). Yet, the BiOp concludes that Project Operations are "a primary factor influencing delta smelt abiotic and biotic habitat suitability, health, and mortality." BiOp at 189 (emphasis added). FWS rationalizes this conclusion, at least in part, by attributing the impacts of many of the "other stressors" to the Projects. This attribution has not been justified, nor is it logical or explained by any science. Given that the impacts of regulating Project Operations are so consequential, such unsupported attributions (a result in search of a rationale) are unconscionable.

(7) Indirect Effects Analysis.

Plaintiffs assert that the BiOp inappropriately categorizes adverse effects on delta smelt from limited food supply, invasive species, and contaminants as "indirect effects" caused by Project Operations. The Joint Consultation Regulations promulgated by FWS and NMFS define: "[i]ndirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." 50 C.F.R. § 402.02 (emphasis added). The ESA's definition differs from NEPA's definition of indirect effects of an action: "[i]ndirect effects, which are caused by the action and are later in time or farther removed in

distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b). In the preamble of the Final Rule adopting the ESA regulations, FWS explained that it intended a narrower regulatory definition of indirect effects under the ESA than applied in the NEPA context (i.e., compare "reasonably certain to occur" with "reasonably foreseeable"). 51 Fed. Reg. 19,926 (June 3, 1986). NMFS and FWS contrasted the ESA with NEPA and expressly explained the intent and rationale for adopting the more narrow "reasonably certain to occur" standard for indirect and cumulative effects under ESA:

> If the jeopardy standard is exceeded, the proposed Federal action cannot proceed without an exemption. This is a substantive prohibition that applies to the Federal action involved in consultation. In contrast, NEPA is procedural in nature, rather than substantive, which would warrant a more expanded review of cumulative effects. Otherwise, in a particular situation, the jeopardy prohibition could operate to block "nonjeopardy" actions because future, speculative effects occurring after the Federal action is over might, on a cumulative basis, jeopardize a listed species. Congress did not intend that Federal actions be precluded by such speculative actions.

51 Fed. Reg. at 19,933.

Shortly after adoption of the ESA regulations, the Ninth Circuit confirmed "'[t]he reasonably certain to occur' standard applies to 'indirect effects ... caused by the proposed action." *Sierra Club v. Marsh*, 816 F.2d 1376, 1388 (9th Cir. 1987); *see also Ariz. Cattle Growers Ass'n v. FWS*, 273 F.3d 1229, 1243 (9th Cir. 2001) (invalidating several incidental take statements

regarding grazing and effects on fish because "it would be unreasonable for [FWS] ... to impose conditions on otherwise lawful land use if a take were not reasonably certain to occur as a result of that activity"); *Ctr. for Biological Diversity v. U.S. Dept. of Hous. & Urban Dev.*, 541 F. Supp. 2d 1091, 1100-01 (D. Ariz. 2008) (dismissing a suit alleging federal agencies had violated the ESA by failing to analyze the indirect effects of providing federal funding to local development projects, concluding that the link between such financial assistance and groundwater depletion that could harm listed species was "too attenuated" to meet the standards of 50 C.F.R. § 402.02). "[T]he mere potential for harm ... is insufficient" to meet the "reasonably certain to occur" standard. *Ariz. Cattle Growers Ass'n*, 273 F.3d at 1246. Other causes must be addressed applying this standard.

a. Effect of Project Operations on Delta Smelt Food Supplies.

The BiOp claims that one of "three major seasonally occurring categories of effects" on delta smelt is "entrainment of *Pseudodiaptomus forbesi*[42], the primary prey of delta smelt during summer-fall." BiOp at 203. The BiOp categorizes this as an "indirect effect." *id.*, and justifies RPA Component 4 (Action

[42] *Pseudodiaptomus forbesi* is a small aquatic copepod introduced into the Delta in 1988, and has since become an important source of prey for delta smelt. BiOp at 184.

6)[43] in part by the statement that "[t]he Effects Section indicates that [*P. forbesi*] distribution may be vulnerable to effects of exports facilities operations and, therefore, the projects have a likely effect on the food supply available to delta smelt." BiOp at 380-81.

The relevant section of the effects analysis provides:

> Entrainment of *Pseudodiaptomus forbesi* (June-September)
>
> Historically, the diet of juvenile delta smelt during summer was dominated by the copepod *Eurytemora affinis* and the mysid shrimp *Neomysis mercedis* (Moyle et al. 1992; Feyrer et al. 2003). These prey bloomed from within the estuary's LSZ and were decimated by the overbite clam *Corbula amurensis* (Kimmerer and Orsi 1996), so delta smelt switched their diet to other prey. *Pseudodiaptomus forbesi* has been the dominant summertime prey for delta smelt since it was introduced into the estuary in 1988 (Lott 1998; Nobriga 2002; Hobbs et al. 2006). Unlike *Eurytemora* and *Neomysis*, *Pseudodiaptomus* blooms originate in the freshwater Delta (John Durand San Francisco State University, oral presentation at 2006 CALFED Science Conference). This freshwater reproductive strategy provides a refuge from overbite clam grazing, but *Pseudodiaptomus* has to be transported to the LSZ during summer to co-occur with most of the delta smelt population. This might make *Pseudodiaptomus* more vulnerable to pumping effects from the export facilities than *Eurytemora* and *Neomysis* were. By extension, the projects might have more effect on the food supply available to delta smelt than they did before the overbite clam changed the LSZ food web. As evidence for this hypothesis, the IEP Environmental Monitoring Program zooplankton data show the summertime density of *Pseudodiaptomus* is generally higher in the South Delta than in Suisun Bay. The ratio of South Delta *Pseudodiaptomus* density to Suisun Bay *Pseudodiaptomus* density was greater than one in 73 percent of the collections from June- September 1988-2006. The average value of this ratio is 22, meaning

[43] Action 6 requires the creation or restoration of 8,000 acres (12.5 square miles) of habitat. BiOp at 379.

> that on average summer *Pseudodiaptomus* density has been 22 times higher in the South Delta than Suisun Bay. Densities in the two regions are not correlated (P > 0.30). This demonstrates that the presence of high copepod densities in the South Delta which delta smelt do not occupy during summer months, do not necessarily occur simultaneously in the LSZ where delta smelt rear.
>
> There is statistical evidence suggesting that the co-occurrence of delta smelt and *Pseudodiaptomus forbesi* has a strong statistical influence on the survival of young delta smelt from summer to fall (Miller 2007). In addition, recent histopathological evaluations of delta smelt have shown possible evidence of food limitation in delta smelt during the summer (Bennett 2005; Bennett et al. 2008). However, the glycogen depletion of the delta smelt livers reported in these studies can also arise from thermal stress due to high summer water temperatures (Bennett et al. 2008).

BiOp at 228. These observations show that *P. forbesi* from the southern Delta are an important source of summer food supply to delta smelt in the lower salinity zone ("LSZ"), and that Project Operations (i.e., export pumping) prevent *P. forbesi* in the South Delta from flowing to the LSZ during that time, causing a reduction in the density of *P. forbesi* that subsequently causes deleterious effects to delta smelt.

Federal Defendants are correct that nothing in the ESA requires FWS to rule out all other potential factors that may or may not play a role in the ecosystem under analysis. *See* Doc. 660 at 58. However, the ESA does require the agency to evaluate the impacts of the proposed action, and make a determination whether the proposed action is likely to have direct and indirect effects on the species. 50 C.F.R. § 402.02 (defining "jeopardize

the continued existence of" to means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."). Plaintiffs argument is simply that "there was no data or analysis in the BiOp (or elsewhere in the record) to support the BiOp's finding that export pumping causes reduced availability of [*P. forbesi]* for consumption by delta smelt in the Low Salinity Zone and that this reduced availability is reasonably certain to occur." Doc. 695 at 55.

Plaintiffs' central complaint is that in evaluating the indirect effect of Project operations on *P. forbesi*, FWS used data from a few Suisun Bay sampling stations to represent the entire lower salinity zone, even though the low salinity zone occurs outside Suisun Bay as well.[44] The peer review found a

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[44] Plaintiffs also summarily argue that this conclusion is unjustified because:

- FWS did not consider or rule out the fact that grazing by exotic clam species causes the observed reduced *P. forbesi* density in Suisun Bay.
- FWS did not consider or rule out the fact that higher densities of *P. forbesi* in the South Delta are caused by differences in spatial distribution between juvenile and adult *P. forbesi* because juveniles are more dense in the South Delta.
- FWS did not consider or account for the fact that Plaintiffs provided FWS with results of regression analyses of the best scientific data available that showed "[*P. forbesi*] densities in Suisun Bay are not correlated with exports ...," but that there is "a highly significant correlation between [*P. forbesi*] densities in Suisun Bay and those in Suisun Marsh, suggesting (unsurprisingly) that if Suisun Bay densities are being subsidized, the most likely source is Suisun Marsh." AR 006369; 006377-006378.

"relationship between outflow and abundance of *P. forbesi* in the [lower salinity zone] ... can be detected only by comparing the distribution of copepods in salinity space rather than relying on sampling station locations." AR 008821. FWS did nothing to correct this problem in the final Effects Analysis.

Plaintiffs also complain that the BiOp contains no quantitative analysis of the impact of exports on *P. forbesi*. Federal Defendants' only response to this criticism is to point out that the draft BiOp did contain a quantitative analysis. This draft was presented to the Peer Review panel, which responded that it "agree[d] with the conceptual model and with the justification of its elements" as "well-supported," but had concerns about parts of that analysis, and recommended that it be revised. Goude Decl., Doc. 470, ¶ 5. The Panel concluded that if a "revised analysis does not show a substantial (not necessarily statistically significant) pattern, the analysis should be mentioned but the results dropped as a quantitative metric from the [Effects Analysis]." *Id*. After considering the Panel's recommendation, FWS decided not to use the analysis as a quantitative metric, instead concluding that a qualitative

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Doc. 551 at 48-49. The support for these arguments were incorporated by reference from the extensive argument concerning the BiOp's food analysis contained in Plaintiffs' motion for Preliminary Injunction. Given the prolixity of briefing and the highly contentious process by which page limits for the motions for summary judgment were set in this case, it would be highly prejudicial to Defendants to permit such extensive incorporation by reference into the summary judgment proceedings. These arguments will not be addressed.

analysis and discussion was sufficient and appropriate for the final 2008 Biological Opinion. *Id.* The BiOp does contain a qualitative discussion of the impacts of the Delta Food Web, acknowledging the effects that the overbite clam has had on the pelagic food web, including upon the delta smelt, BiOp at 184-85, but noting "it is uncertain whether this is a direct consequence of the overbite clam." BiOp at 184.

Although nothing in the ESA mandates the use of quantitative analyses *per se*, the Peer Review's critique of the *P. forbesi* analysis cannot be separated from FWS's abandonment of its quantitative analysis. The Peer Review specifically criticized the use of fixed-location monitoring sites as part of the quantitative analysis. Rather than correct this problem, FWS's response was to abandon the quantitative analysis, choosing to advance the same, potentially flawed conclusion in a more subjective, qualitative analysis. This conduct suggests another unlawful, results-driven choice, ignoring best available science.

b. Pollution and Contaminants

The BiOp claims "[r]earing habitat in the South Delta may also be impacted indirectly through increases in contaminant concentrations." BiOp at 242. In assessing Project effects to critical habitat, the BiOp states "[t]he contaminant effects may be generated or diluted by flow depending on the amount of flow, the type of contaminant, the time of year, and relative

concentrations." BiOp at 240.

Plaintiffs argue "[g]eneral statements like this do not comport with ESA's requirements for attributing indirect effects to an action." Doc. 661 at 50. Plaintiffs contend: "[t]o meet ESA's regulatory standard for indirect effects," requiring such indirect effects be "reasonably certain to occur" FWS must "support these general hypotheses with discussion and use of scientific data showing":

> (1) how a specific individual contaminant concentration (e.g., ammonia, mercury, pyrethroids, etc.) would be increased by a particular flow modification caused by Project Operations;
>
> (2) at what time of year or month such flow modifications and contaminant concentration increases would occur; and
>
> (3) how and to what extent this alleged contaminant increase would affect the abundance of delta smelt.

Id. Plaintiffs do not cite any specific statute, regulation, or case that requires such specific findings before an impact is a sufficient indirect effect. The record must reflect that contaminant-related impacts indirectly caused by Project Operations are "reasonably certain" to occur. It is undisputed that contaminants are not introduced by the Projects, rather by others conducting municipal, industrial, and agricultural (runoff) activities.

FWS provided a qualitative discussion of the impacts of pollutants and changed Delta hydrodynamics resulting from Project

operations upon the smelt:

Contaminants

Contaminants can change ecosystem functions and productivity through numerous pathways. However, contaminant loading and its ecosystem effects within the Delta are not well understood. Although a number of contaminant issues were first investigated during the POD years, concern over contaminants in the Delta is not new. There are long-standing concerns related to mercury and selenium levels in the watershed, Delta, and San Francisco Bay (Linville et al. 2002; Davis et al. 2003). Phytoplankton growth rate may, at times, be inhibited by high concentrations of herbicides (Edmunds et al. 1999). New evidence indicates that phytoplankton growth rate is chronically inhibited by ammonium concentrations in and upstream of Suisun Bay (Wilkerson et al. 2006, Dugdale et al. 2007). Contaminant-related toxicity to invertebrates has been noted in water and sediments from the Delta and associated watersheds (e.g., Kuivila and Foe 1995, Giddings 2000, Werner et al. 2000, Weston et al. 2004). Undiluted drainwater from agricultural drains in the San Joaquin River watershed can be acutely toxic (quickly lethal) to fish and have chronic effects on growth (Saiki et al. 1992). Evidence for mortality of young striped bass due to discharge of agricultural drainage water containing rice herbicides into the Sacramento River (Bailey et al. 1994) led to new regulations for water discharges. Bioassays using caged Sacramento sucker (Catostomus occidentalis) have revealed deoxyribonucleic acid strand breakage associated with runoff events in the watershed and Delta (Whitehead et al. 2004). Kuivila and Moon (2004) found that peak densities of larval and juvenile delta smelt sometimes coincided in time and space with elevated concentrations of dissolved pesticides in the spring. These periods of cooccurrence lasted for up to 2-3 weeks, but concentrations of individual pesticides were low and much less than would be expected to cause acute mortality. However, the effects of exposure to the complex mixtures of pesticides actually present are unknown.

The POD investigators initiated several studies beginning in 2005 to address the possible role of contaminants and disease in the declines of Delta fish and other aquatic species. Their primary study consists of twice-monthly monitoring of ambient water toxicity at fifteen sites in the Delta and Suisun Bay. In 2005 and 2006, standard bioassays using the amphipod Hyalella azteca had low (<5 percent) frequency of occurrence of toxicity (Werner et al. 2008). However, preliminary results from 2007, a dry year, suggest the

incidence of toxic events was higher than in the previous (wetter) years. Parallel testing with the addition of piperonyl butoxide, an enzyme inhibitor, indicated that both organophosphate and pyrethroid pesticides may have contributed to the pulses of toxicity. Most of the tests that were positive for H. azteca toxicity have come from water samples from the lower Sacramento River. Pyrethroids are of particular interest because use of these insecticides has increased within the Delta watershed (Ameg et al. 2005, Oros and Werner 2005) as use of some organophosphate insecticides has declined. Toxicity of sediment-bound pyrethroids to macroinvertebrates has also been observed in small, agriculture-dominated watersheds tributary to the Delta (Weston et al. 2004, 2005). The association of delta smelt spawning with turbid winter runoff and the association of pesticides including pyrethroids with sediment is of potential concern.

In conjunction with the POD investigation, larval delta smelt bioassays were conducted simultaneously with a subset of the invertebrate bioassays. The water samples for these tests were collected from six sites within the Delta during May-August of 2006 and 2007. Results from 2006 indicate that delta smelt are highly sensitive to high levels of ammonia, low turbidity, and low salinity. There is some preliminary indication that reduced survival may be due to disease organisms (Werner et al. 2008). No significant mortality of larval delta smelt was found in the 2006 bioassays, but there were two samples [] collected from sites along the Sacramento River and had relatively low turbidity and salinity levels and moderate levels of ammonia. It is also important to note that no significant H. azteca mortality was detected in these water samples. While the H. azteca tests are very useful for detecting biologically relevant levels of water column toxicity for zooplankton, interpretation of the H. azteca test results with respect to fish should proceed with great caution. The relevance of the bioassay results to field conditions remains to be determined.

The POD investigations into potential contaminant effects also include the use of biomarkers that have been used previously to evaluate toxic effects on POD fishes (Bennett et al. 1995, Bennett 2005). The results to date have been mixed. Histopathological and viral evaluation of young longfin smelt collected in 2006 indicated no histological abnormalities associated with exposure to toxics or disease (Foott et al. 2006). There was also no evidence of viral infections or high parasite loads. Similarly, young threadfin shad showed no histological evidence of contaminant effects or of viral infections (Foott et al. 2006). Parasites were noted in threadfin shad gills at a high frequency but

> the infections were not considered severe. Both longfin smelt and threadfin shad were considered healthy in 2006. Adult delta smelt collected from the Delta during the winter of 2005 also were considered healthy, showing little histopathological evidence for starvation or disease (Teh et al., unpublished data). However, there was some evidence of low frequency endocrine disruption. In 2005, 9 of 144 (6 percent) of adult delta smelt males sampled were intersex, having immature oocytes in their testes (Teh et al., unpublished data).
>
> In contrast, preliminary histopathological analyses have found evidence of significant disease in other species and for POD species collected from other areas of the estuary. Massive intestinal infections with an unidentified myxosporean were found in yellowfin goby *Acanthogobius flavimanus* collected from Suisun Marsh. Severe viral infection was also found in inland silverside and juvenile delta smelt collected from Suisun Bay during summer 2005. Lastly, preliminary evidence suggests that contaminants and disease may impair survival of age-0 striped bass. Baxter et al. 2008 found high occurrence and severity of parasitic infections, inflammatory conditions, and muscle degeneration in young striped bass collected in 2005; levels were lower in 2006. Several biomarkers of contaminant exposure including P450 activity (i.e., detoxification enzymes in liver), acetylcholinesterase activity (i.e., enzyme activity in brain), and vitellogenin induction (i.e., presence of egg yolk protein in blood of males) were also reported from striped bass collected in 2006 (Ostrach 2008).

BiOp at 186-188.

It is not clear how the BiOp or any other document in the record links the impacts of contaminants to Project Operations. The BiOp does link the position of X2 to the extent of available delta smelt habitat, suggesting that a more confined habitat "may increase" the effects of contaminants:

> During the fall, when delta smelt are nearing adulthood, the amount of suitable abiotic habitat for delta smelt is positively associated with X2. This results from the effects of Delta outflow on salinity distribution throughout the Estuary. Fall X2 also has a measurable effect on recruitment of juveniles the

> following summer in that it has been a significant covariate in delta smelt's stock-recruit relationship since the invasion of the overbite clam. Potential mechanisms for the observed effect are two-fold. First, positioning X2 seaward during fall provides a larger habitat area which presumably lessens the likelihood of density-dependent effects (e.g., food availability) on the delta smelt population. Second, a more confined distribution may increase the impact of stochastic events that increase mortality rates of delta smelt. For delta smelt, this includes predation and anthropogenic effects such as contaminants and entrainment (Sommer et al. 2007).

BiOp at 234. The Effects on Critical Habitat section states:

> [T]hrough upstream depletions and alteration of river flows, the CVP/SWP has played a role in altering the environment of the Delta. This has resulted in adverse effects to delta smelt spawning habitat availability and may mobilize contaminants. The contaminant effects may be generated or diluted by flow depending on the amount of flow, the type of contaminant, the time of the year, and relative concentrations.

BiOp at 240.

FWS may only count indirect effects as effects of the action if they are "reasonably certain to occur." FWS's contaminants analysis does not demonstrate it has complied with this requirement. It must be done.

(8) Critical Habitat as Independent Basis for RPA.

Federal Defendants argue that, even if Plaintiffs demonstrate that the BiOp's "jeopardy" findings were arbitrary and capricious, the Court should nevertheless deny Plaintiffs' motion because the RPA is necessary to avoid adverse modification of the delta smelt's critical habitat. Doc. 660 at 55-58. The ESA requires, once FWS finds the proposed agency action will

result in "jeopardy or adverse modification [of critical habitat] ... the Secretary shall suggest those reasonable and prudent alternatives which [it] believes would not violate [Section 7(a)(2)] and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A). Avoiding adverse modification of critical habitat is an independent statutory basis for promulgation of an RPA. Federal Defendants maintain that, in light of the statutory mandate to avoid both jeopardy and adverse modification, Plaintiffs must make a separate showing, independent of or in addition to their jeopardy arguments, that the BiOp's findings on critical habitat are also arbitrary and capricious. This is true in part. To support a finding that the adverse modification conclusion is arbitrary and capricious, Plaintiffs must demonstrate either that the underlying critical habitat analysis was independently flawed or that the critical habitat analysis was entirely dependent on flawed aspects of the jeopardy analysis. Whether or not the RPA and its constituent Actions are erroneous is a separate question.

The BiOp makes findings concerning the impact of export pumping on delta smelt critical habitat, *see* BiOp at 190-202; 239-244, and concludes:

> After reviewing the current status of delta smelt critical habitat, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the coordinated operations of the CVP and SWP, as proposed, are likely to adversely modify delta smelt critical habitat. The Service

> **reached this conclusion based on the following findings, the basis for which is presented in the preceding Status of Critical Habitat/Environmental Baseline, Effects of the Action, and Cumulative Effects sections of this document.**
>
> **1. The conservation role of delta smelt critical habitat is to provide migration, spawning and rearing habitat conditions necessary for successful delta smelt recruitment at levels that will provide for the conservation of the species. Appropriate physical habitat (PCE 1), water (PCE 2), river flows (PCE 3), and salinity (PCE 4) are essential for successful delta smelt spawning and survival.**
>
> **2. The past and present operations of the CVP/SWP have degraded these habitat elements (particularly PCEs 2-4) to the extent that their co-occurrence at the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation.**
>
> **3. Implementation of the proposed action is expected to perpetuate the very limited cooccurrence of PCEs at appropriate places and times by: (a) altering hydrologic conditions in a manner that adversely affects the distribution of abiotic factors such as turbidity and contaminants; (b) altering river flows to an extent that increases delta smelt entrainment at Banks and Jones, as well as reduces habitat suitability in the Central and South Delta; and (c) altering the natural pattern of seasonal upstream movement of the LSZ to an extent that is likely to reduce available habitat for the delta smelt within areas designated as critical habitat.**
>
> **The proposed action does include a provision for VAMP to address augmentation of river flow but future implementation of this provision is not well defined, making its beneficial effects on the PCEs of delta smelt critical habitat uncertain.**
>
> **4. On the basis of findings (1)-(3) above, the Service concludes that implementation of the proposed action is likely to prevent delta smelt critical habitat from serving its intended conservation role.**

BiOp 278-79.

Plaintiffs respond to Federal Defendants' argument that the critical habitat analysis is actually flawed in a number of ways:

(1) FWS failed to identify the threshold for adverse modification, or to assess and explain whether the magnitude and extent of any claimed effects to critical habitat rise to that threshold level;

(2) in making finding 3(a), the BiOp did not provide analysis or explanation showing how alleged indirect effects to critical habitat will be caused by Project operations and will be reasonably certain to occur; and

(3) in making findings 3(b) and 3(c), FWS expressly relied on the flawed analyses of entrainment and X2.

Doc. 697 at 64-71:[45]

a. <u>Identification of a Threshold For Adverse Modification/ Explanation of How Any Alleged Alteration To Critical Habitat Would Exceed that Threshold.</u>

The BiOp's critical habitat findings 1 and 2 state that "appropriate" habitat elements are "essential" and have been "degraded ... to the extent that their co-occurrence at the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation." BiOp at 278. However,

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[45] Federal Defendants' motion to strike these arguments on the ground that they were raised for the first time in Plaintiffs' reply brief was denied. Federal Defendants were afforded the opportunity to respond, *see* Doc. 745 at 2, which they did, *see* Doc. 746 at 2-7.

Plaintiffs complain that the BiOp does not explain the extent of co-occurrence of habitat elements that is necessary for conservation of delta smelt; the magnitude of the claimed degradation of this co-occurrence that is attributable to Project operations; or why that effect renders the habitat elements "insufficient" to support the species' recovery. Plaintiffs argue, without such analysis there is no basis for FWS to conclude that habitat changes caused by Project operations will result in adverse modification of critical habitat.

Destruction or adverse modification means "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." 50 C.F.R. § 402.02. Previous rulings in related cases have held "that NMFS and FWS have interpreted the term 'appreciably diminish' to mean 'considerably reduce.'" Findings of Fact and Conclusions of Law Re the Existence of Irreparable Harm, *PCFFA v. Gutierrez*, 1:06-cv-245 OWW GSA, Doc. 367 at 24:6-9 (citing Consultation Handbook at 4-34).

Plaintiffs cite *Gifford Pinchot*, 378 F.3d at 1074, and *NWF v. NMFS II*, 524 F.3d at 932 & n.10, for the principle that FWS must identify a threshold for adverse modification and assess and explain whether the magnitude and extent of any claimed effects to critical habitat reach that threshold. These cases do not support Plaintiff's argument. *Gifford Pinchot* rejected FWS's

interpretation of "adverse modification" in a manner that only triggered an adverse modification finding where there is "an appreciable diminishment of the value of critical habitat for both survival and recovery." *Id.* at 1069. After rejecting FWS's rationale for applying the regulation, the Ninth Circuit reasoned that the various biological opinions at issue could nevertheless be found valid if they actually evaluated the impact to recovery. The *Gifford Pinchot* plaintiffs raised concerns about FWS's complete failure to address the issue of recovery in that biological opinion's critical habitat analysis. The Appeals Court specifically found that FWS detailed the percentage loss of critical habitat but did not discuss the specific impact of that loss on recovery, rendering the BiOp insufficient. 378 F.3d at 1074.

Following *Gifford Pinchot*, *NWF v. NMFS II* held that NMFS acted arbitrarily and capriciously by failing to analyze the impacts of dam operations on the recovery value of critical habitat. 524 F.3d at 932. NMFS' argument "that it 'implicitly' analyzed recovery in its survival analysis" was rejected as a "post hoc justification," because a court cannot consider "an analysis that is not shown in the record." *Id.* at 932 n.10 (internal citations and quotations omitted). Plaintiffs do not directly challenge the BiOp's recovery analysis; rather, they argue that the BiOp should have set a "threshold" for adverse

modification. Nothing in *Gifford Pinchot* or *NWF v. NMFS II* requires FWS to set a "threshold" for adverse modification.

Butte Environmental Council v. U.S. Army Corps of Engineers, 607 F.3d 570, 582-83 (9th Cir. 2010), suggests exactly the opposite. *Butte* upheld FWS's determination that destruction of a very small percentage (less than 1%) of designated critical habitat would not adversely modify the species' critical habitat. Relevant here is the Ninth Circuit's rejection of a demand that FWS address the rate of loss of critical habitat, finding that nothing in the statute or regulations requires FWS to perform such a calculation. *Id.*

Plaintiffs extensively discuss the BiOp's critical habitat analysis to attempt to demonstrate the BiOp does not identify a threshold for adverse modification or what standard for adverse modification FWS applied. *See* Doc. 697 at 66-69. Plaintiffs criticize the individual critical habitat findings for failing to clearly describe the effects of project operations on the quantity or quality of the individual habitat elements.

This disassembly, focusing on the critical habitat conclusion, does not consider the BiOp as a whole. The BiOp's adverse modification determination relies on four components: "(1) the Status of Critical Habitat... ; (2) the Environmental Baseline... ; (3) the Effects of the Action... ; and (4) Cumulative Effects...." BiOp at 139. The Status of the

Species/Environmental Baseline sections analyze how project operations have degraded the PCEs up to the present time, while the Effects Analysis analyzes how these ongoing operations will continue to adversely modify critical habitat in the future. *See id.* at 202-203. Most of the impacts analysis is found in the Status of the Species / Environmental Baseline section. The Effects Analysis explains that these well-documented prior effects will continue due to ongoing Project operations. *Id.*

In the discussion of PCE # 2 (water quality, including abiotic elements), the BiOp explains how this PCE's condition is substantially degraded by Project operations. FWS found that project operations cause "[p]ersistent confinement of the effective spawning population" and otherwise "adversely affect" turbidity, "reproductive success," the availability of prey, and the exposure of delta smelt to contaminants and to localized catastrophic events. *Id.* at 197. Plaintiffs' omnibus complaint that the critical habitat section entirely lacks analytical structure is overbroad.

b. Reliance On Assumptions Of Indirect Effects Without Providing Evidence That These Indirect Effects Are Reasonably Certain To Occur.

Plaintiffs argue BiOp critical habitat finding 3(a), BiOp at 278, is flawed as unsupported by any analysis verifying that Project-induced changes to Delta hydrodynamics interact with other abiotic factors to exacerbate the effects of those factors

on the delta smelt's critical habitat. Plaintiffs assert the BiOp's conclusory assertions do not explain how described indirect effects to critical habitat are reasonably certain to occur. *See* 50 C.F.R. § 402.02 (requiring that indirect effects be reasonably certain to occur).

The BiOp concludes the impact of Project Operations on PCE 2 (Water), "[a]s described in the Effects Section, the CVP/SWP alter the hydrologic conditions within spawning habitat throughout the spawning period for delta smelt by impacting various abiotic factors including the distributions of turbidity, food, and contaminants." BiOp at 239; *see also* BiOp at 241 ("In addition, pumping at Banks and Jones can alter flows within the Delta. This results in a corresponding alteration of larval and juvenile transport."); BiOp at 242 ("As described in the Effects Section, the CVP/SWP alter the hydrologic conditions within rearing habitat throughout the spawning period for delta smelt by impacting various abiotic factors including distributions of turbidity, food, and contaminants."); *id.* ("Pumping at Banks and Jones alters flows within the Delta. As described in the Effects Section, negative flows can result in an increased risk of entrainment when rearing habitat includes the South Delta."); BiOp at 243 ("As stated previously, the CVP/SWP alters the extent and location of the LSZ by modifying both the Sacramento and San Joaquin river flows which reduces habitat quality and

quantity).).

The BiOp links export pumping and contaminant effects:

> The CVP and SWP, as analyzed in the Effects Section, directly influence the location and the amount of suitable spawning habitat, especially in drier WYs. Further, through upstream depletions and alteration of river flows, the CVP/SWP has played a role in altering the environment of the Delta. This has resulted in adverse effects to delta smelt spawning habitat availability and may mobilize contaminants. The contaminant effects may be generated or diluted by flow depending on the amount of flow, the type of contaminant, the time of the year, and relative concentrations.

BiOp at 239. Although, the BiOp supports the conclusion that the Projects drive hydrodynamics during times of balanced conditions, nowhere in the BiOp or in any record citation provided by any party is there any support for the conclusion that Project operations are reasonably certain to exacerbate contaminant impacts. It is logical that changes in hydrodynamics could impact exposure to contaminants in the water, but the extent of this influence is unknown and unsupported by any analysis or record citation.

c. Reliance on Analysis Of Entrainment and X2 in Support of the Adverse Modification Determination.

Plaintiffs opening brief argued: "the BiOp's determination that proposed Project Operations will adversely modify critical habitat rests upon the same defective Project Effects Analysis that led FWS to its determination that Project Operations would jeopardize the delta smelt." Doc. 551 at 63. The critical

habitat conclusion section does explicitly rely on conclusions reached in the effects analysis' regarding entrainment and the movement of X2. For example, Critical Habitat conclusion #3 provides:

> 3. Implementation of the proposed action is expected to perpetuate the very limited co-occurrence of PCEs at appropriate places and times by: (a) altering hydrologic conditions in a manner that adversely affects the distribution of abiotic factors such as turbidity and contaminants; (b) altering river flows to an extent that increases delta smelt entrainment at Banks and Jones, as well as reduces habitat suitability in the Central and South Delta; and (c) altering the natural pattern of seasonal upstream movement of the [Low Salinity Zone ("LSZ")] to an extent that is likely to reduce available habitat for the delta smelt within areas designated as critical habitat.

BiOp at 278.

The BiOp's general conclusion that Project Operations increase delta smelt entrainment with resulting population-level impacts within year classes is valid. It is, rather, the BiOp's quantitative conclusions regarding the exact negative OMR flow ranges that are unfounded. FWS did not err by incorporating this general conclusion in its Critical Habitat conclusion.

As for the inclusion of the finding that Project Operations alter the natural pattern of seasonal movement of the Low Salinity Zone ("LSZ"), this underlying conclusion from the Effects section is not supported by the record, because it is based at least in part on the invalid quantitative analysis using the Calsim II to Dayflow comparison. This aspect of the critical

habitat analysis is without record support. These areas must be addressed on remand.

(9) Discretionary v. Nondiscretionary Actions.

Plaintiffs complain that the BiOp's Project Effects analysis was "tainted" because it does not distinguish between discretionary and non-discretionary actions. Doc. 551 at 61-63. *National Association of Home Builders v. Defenders of Wildlife*, 551 U.S. 644 (2008), held that ESA § 7's consultation requirements do not apply to non-discretionary actions. Where an agency is required by law to perform an action, it lacks the power to insure that the action will not jeopardize the species. *Id*. at 667. Plaintiffs' cite the Coordinated Operations Agreement, the Central Valley Project Improvement Act's ("CVPIA") requirements to deliver water for Central Valley wildlife refuge areas, and D-1641 as examples of mandatory aspects of Project operations that, they claim, should have been segregated from other Project Operations in the Project Effects Analysis.

However, *Home Builders* does not address whether, once section 7 consultation is triggered, the jeopardy analysis must separately identify and segregate discretionary from non-discretionary actions, relegating the non-discretionary actions to the environmental baseline. *Home Builders* addressed whether the section 7 consultation obligation attaches to a particular agency action at all. *See Home Builders*, 551 U.S. at 669-70

(holding that consultation "duty does not attach to actions... that an agency is required by statute to undertake....") (emphasis added). Plaintiffs do not suggest that section 7 does not apply to the coordinated operations of the Projects. Rather, Plaintiffs contend that the section 7 consultation process requires distinguishing between discretionary and non-discretionary Project operations to identify the actions not subject to Section 7. Neither *Home Builders* nor the regulation interpreted in *Home Builders*, 50 C.F.R. § 402.03, includes any such requirement. Plaintiffs' motion for summary judgment that the BiOp unlawfully failed to distinguish between discretionary and non-discretionary actions is DENIED. This does not mean non-discretionary actions required by law must not be considered in the consultation process. Federal Defendants and Defendant-Intervenors' cross-motion on identification of non-discretionary actions is GRANTED.

B. Application of the RPA Regulations.

Plaintiffs next argue that, in adopting the RPA, Federal Defendants did not undertake the analysis required by Section 7 and its Joint Consultation Regulations. Doc. 551 at 65-79. Under the ESA, if a biological opinion concludes that a proposed agency action will cause jeopardy to a listed species or result in the destruction or adverse modification of its critical habitat, "the Secretary shall suggest those reasonable and

prudent alternatives which he believes would not violate subsection (a)(2) and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A); 50 C.F.R. § 402.14(h)(3). The Joint Consultation Regulations define such reasonable and prudent alternatives as follows:

> Reasonable and prudent alternatives refer to alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is [sic] economically and technologically feasible, and that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

50 C.F.R. § 402.02; *see also* 51 Fed. Reg. at 19,958; 50 C.F.R. § 402.14(g)(5); *Home Builders*, 551 U.S. at 652 (Section 402.02 defines what qualifies as an RPA). Under this definition, an RPA must: (1) be consistent with the purpose of the underlying action; (2) be consistent with the action agency's authority; (3) be economically and technologically feasible; and (4) avoid the likelihood of jeopardy to the species or adverse modification of its critical habitat. 50 C.F.R. § 402.02; *see also* 16 U.S.C. § 1536(b)(3)(A); *Greenpeace v. Nat'l Marine Fisheries Serv.*, 55 F. Supp. 2d 1248, 1264 (W.D. Wash. 1999).

(1) <u>FWS Did Not Explicitly Analyze Any of the Four Factors in the BiOp.</u>

It has already been determined that "the BiOp does not

explicitly discuss the first three factors -- consistency with the purpose of the action; consistency with the legal authority and jurisdiction of the action agency; and economic and technological feasibility -- at all." Memorandum Decision Re Cross Motions for Summary Judgment Re Reasonable and Prudent Alternative Claims, Doc. 354 at 16 ("None of the terms 'consistent with the intended purpose of the action,' 'jurisdiction,' 'legal authority,' or 'economically and technologically feasible,' are used in the RPA section of the BiOp."). "[I]t is undisputed that the BiOp's language contains no such discussion." *Id.* at 21.

An October 15, 2009 Decision rejected Plaintiffs' earlier argument that this analysis must be included "on the face" of the BiOp. *See* Doc. 354 at 38. However, the question of whether FWS properly promulgated the RPA was left to be "decided on the basis of the entire record." *Id.* at 51. Of the four requirements, "[j]eopardy has been found to be the 'guiding standard' for determination of RPAs." *Id.* at 27 (citing *Greenpeace* 55 F. Supp. 2d at 1268). Whether and how the record must demonstrate compliance with § 402.02 is a separate question.

(2) Compliance with § 402.02.

Plaintiffs allege that FWS violated the APA because the administrative record contains no meaningful analysis related to the first three requirements of § 402.02, and that, while FWS

undertook some analysis regarding whether its RPA would avoid jeopardizing delta smelt (the fourth factor described in § 402.02), that analysis is flawed because it was not based upon the best available science.

a. Jeopardy Factor (Fourth Factor).

Plaintiffs maintain that FWS violated the ESA by adopting its RPA without providing a reasoned analysis regarding how the various RPA actions will avoid the likelihood of jeopardizing the delta smelt or adversely modifying its critical habitat. The Consultation Handbook directs that "[w]hen a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to avoid jeopardy." Consultation Handbook at 4-43. Plaintiffs do not dispute that the BiOp contains extensive discussion of the need for the RPA components. Rather, Plaintiffs contend that the RPA violates § 402.2 because that discussion is not based on the best available science.

The § 402.02 requirements and the best available science requirement are separate. It is undisputed that both the BiOp and its RPA must be based on the best available science, but a violation of that requirement does not necessarily violate § 402.02. Whether each part of the jeopardy analysis relies on the best available science is discussed above. Section 402.02

does not provide an independent statutory basis for imposing liability upon FWS for failing to comply with the best available science requirement. Plaintiffs' motion for summary judgment on this ground is DENIED; Federal Defendants' and Defendant-Intervenors' is GRANTED.

b. Non-Jeopardy Factors (Factors One Through Three).

It is undisputed that the BiOp contains no explicit discussion of the first three factors: (1) consistency with the purpose of the underlying action; (2) consistency with the action agency's authority; and (3) economic and technological feasibility. Plaintiffs insist that the ESA and its implementing regulations require that the record contain explicit "analyses" of each of the four factors. As authority, Plaintiffs invoke general principles of Administrative Law, including the rule that a court "cannot infer an agency's reasoning from mere silence." *See PCFFA*, 426 F.3d at 1091.

It is undisputed that there is no explicit analysis anywhere in the record of the three non-jeopardy factors. Federal Defendants and Defendant-Intervenors dismiss this fact, arguing (1) that no such explicit analysis is required by law and (2) that satisfaction of all three factors is so obvious that explicit analysis is unnecessary. *See* Doc. 660 at 70-72; Doc. 661-3 at 35-38.

Many of the cases upon which the parties now rely were

discussed in the October 15, 2009 Decision:

> Plaintiffs and DWR rely on caselaw to support their contention that, despite the lack of an explicit requirement, the BiOp must include findings treating the first three RPA requirements. It is undisputed that an agency acts arbitrarily and/or capriciously when it fails to consider an important aspect of a problem before it. *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS*, 265 F.3d 1028, 1034 (9th Cir. 2001) ("*PCFFA I*"). But, whether an agency must expressly consider any particular issue on the face of its decisional document, as opposed to elsewhere in the administrative record, is a different question. On the one hand, an agency action may be upheld even if it is of "less than ideal clarity" as long as "the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc.*, 419 U.S. 281, 285-86 (1974). However, a court "cannot infer an agency's reasoning from mere silence..." but must "rely only on what the agency actually said...." *Compare Gifford Pinchot Task Force v. U.S. Fish and Wildlife Serv.*, 378 F.3d 1059, 1072 n.9 (9th Cir. 2004) (holding that the court "may only rely on what the agency said in the record to determine what the agency decided and why"); *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS*, 426 F.3d 1082, 1092 (9th Cir. 2005) ("*PCFFA II*") (citing *Gifford Pinchot* for the proposition that a court must "rely only on what the agency actually said in the biological opinion"). Does the caselaw require that the RPA requirements be discussed on the face of the BiOp?
>
> Plaintiffs place great weight on the Ninth Circuit's decision in *Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation*, 143 F.3d 515, 518 (9th Cir. 1998), upholding a FWS biological opinion concluding that Reclamation's operations on Lake Mead and the Lower Colorado River would jeopardize an endangered bird species, the Southwestern Willow Flycatcher. Before the BiOp was finalized, FWS sent Reclamation a draft RPA comprised of a number of short and long-term components. *Id.* Some of the short-term measures would have required Reclamation to lower the level of Lake Mead. Reclamation advised FWS that it lacked discretion to do so. *Id.* FWS's final BiOp confirmed that project operations would jeopardize the species, but proposed a new RPA which no longer

required Reclamation to take the originally-proposed short term actions, replacing them with other short term measures. *Id*.

Environmental plaintiffs argued that FWS improperly rejected the draft RPA in favor of the final RPA, which does less to preserve habitat near Lake Mead, "based on Reclamation's alleged lack of discretion to lower the level of Lake Mead." *Id*. at 523. Specifically, Plaintiffs complained "that the secretary never independently reviewed Reclamation's representation that it lacked such discretion." *Id*.

The Ninth Circuit rejected this argument on several grounds. First, "under the ESA, the Secretary was not required to pick the first reasonable alternative the FWS came up with in formulating the RPA. The Secretary was not even required to pick the best alternative or the one that would most effectively protect the Flycatcher from jeopardy.... The Secretary need only have adopted a final RPA which complied with the jeopardy standard and which could be implemented by the agency." *Id*. at 523 (emphasis added).

Second, "under the ESA, the Secretary was not required to explain why he chose one RPA over another, or to justify his decision based solely on apolitical factors.[FN5]" *Id*. Footnote 5 further explains:

> The Secretary must rely on "the best scientific and commercial data available" in formulating an RPA, 16 U.S.C. § 1536(a)(2). However, the ESA does not explicitly limit the Secretary's analysis to apolitical considerations. If two proposed RPAs would avoid jeopardy to the Flycatcher, the Secretary must be permitted to choose the one that best suits all of its interests, including political or business interests.

Id.

The Ninth Circuit then articulated the governing standard: "The only relevant question before [the court] for review was whether the Secretary acted arbitrarily and capriciously or abused his discretion in adopting the final RPA." *Id*. "In answering this question, the court had only to determine if the final RPA met the standards and requirements of the ESA. The court was not in a position to determine if the draft

RPA should have been adopted or if it would have afforded the Flycatcher better protection." *Id.*

The Ninth Circuit reviewed the evidence and found no APA violation:

> Upon careful review of the evidence, we cannot say the district court erred in finding that the final RPA met the standards and requirements of the ESA. The district court determined that the FWS considered the relevant factors and reasonably found that the Flycatcher could survive the loss of habitat at Lake Mead for eighteen months until 500 acres could be protected, then survive an additional two years until an additional 500 acres could be protected, and finally survive through the MSCP process until compensation could be made for the historical habitat lost on the Lower Colorado River and until an extensive ecological restoration could be undertaken. Southwest failed to present any convincing evidence to contradict the FWS' findings. Southwest merely relied upon the discarded draft RPA which had indicated that preservation of the Lake Mead habitat was necessary to the survival of the Flycatcher. However, upon further consideration of the matter, the FWS was entitled to, and did, in fact, change its mind. The FWS concluded in the final BO that the proposed short-term and long-term provisions of the final RPA would avoid jeopardy to the Flycatcher, notwithstanding the failure to modify Reclamation's operation of Hoover Dam at Lake Mead. Because there was a rational connection between the facts found in the BO and the choice made to adopt the final RPA, and because we must defer to the special expertise of the FWS in drafting RPAs that will sufficiently protect endangered species, we cannot conclude that the Secretary violated the APA.

Id. (emphasis added).

Plaintiffs argue the emphasized text, approving FWS's RPA because there was a rational connection between the facts "found in the BiOp" and that decision, establishes that the FWS must make findings on all four RPA requirements on the face of the BiOp. This overstates the Ninth Circuit's holding. First,

Southwest Center says nothing about requiring findings on the face of the BiOp. The requisite findings were, unsurprisingly, in the BiOp in that case, because those findings concerning how each component of the final RPA would avoid jeopardy, were explicitly required by the Consultation Handbook. Consultation Handbook 4-41 ("When a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to avoid jeopardy and/or adverse modification.")(emphasis added). Neither the Handbook, the ESA, nor any of its implementing regulations explicitly require that the BiOp contain an analysis of any of the other three RPA requirements.

Plaintiffs suggest the second sentence from the *Southwest Center* language delineates that findings are required for all four RPA requirements. Plaintiffs quote that sentence as authority to claim the "'FWS considered the relevant factors and reasonably found'[] the Joint Consultation Regulations requirements were satisfied with respect to an RPA issued in a biological opinion for the Southwest Willow Flycatcher...." Doc. 237 at 10. This is misleading, because the entire sentence makes clear that the only "findings" discussed in *Southwest Center* were findings concerning the capacity of the Flycatcher to survive in the short term while the RPA was being implemented. 143 F.3d at 523. *Southwest Center* only stands for the proposition that FWS must justify its conclusion that the RPA would prevent jeopardy and/or adverse modification in the BiOp. *See Greenpeace*, 55 F. Supp. 2d at 1268 (finding the jeopardy determination to be the "guiding standard" for determination of RPAs). *Southwest Center* does not create the discussion requirement Plaintiffs suggest.

PCFFA II, on which Plaintiffs also rely, is not contrary. 426 F.3d 1082. There, the Ninth Circuit overturned an RPA adopted for coho salmon because NMFS failed to articulate the bases for its assumptions underlying the RPA. *Id.* at 1090-95. The district court concluded that the agency had "implicitly considered" whether all three phases of the RPA would ensure against jeopardy. *Id.* at 1091. The Ninth Circuit emphasized that "it is a basic principle of administrative law that the agency must articulate the reason or reasons for its decision." *Id.*

The Ninth Circuit found "little substance to the discussions of Phases I and II" in the BiOp. *Id.* at 1093. Although some language suggested that "the agency believed that the RPA would avoid jeopardy to the coho, this assertion alone is insufficient to sustain the BiOp and the RPA." *Id.* The Ninth Circuit refused to "take [the agency's] word that the species will be protected if its plans are followed." *Id.* As in *Southwest Center*, *PCFFA II* only discussed whether the RPA would avoid jeopardy, the analysis of which is explicitly required in the BiOp. Here, Plaintiffs seek to extend this logic to mandate that FWS include specific findings concerning the three other RPA requirements in the BiOp. *PCFFA II* does not require this.

Plaintiffs also cite *NRDC v. Kempthorne*, 506 F. Supp. 2d 322 (E.D. Cal. 2007), which held that, although certain, potentially critical data was part of the administrative record, its significance, or lack thereof, was not discussed in the BiOp. *Id.* at 362-363. The government's post hoc reasoning was rejected, that, even if the data had been addressed in the BiOp, the ultimate opinion reached by the Service would not have been different. "Although a decision of less than ideal clarity may be upheld if the agency's path may reasonably be discerned, [a court] cannot infer an agency's reasoning from mere silence. Rather, an agency's action must be upheld, if at all, on the basis articulated by the agency itself." *Id.* at 366 (citing *PCFFA*, 426 F.3d at 1091). The district court further reasoned "[h]ad FWS examined the FMWT 2004 data in the BiOp, the weight it gave to that data would have been entitled to deference. The agency's silence cannot be afforded deference." *Kempthorne*, 506 F. Supp. 2d at 366.

Plaintiffs argue that this language reflects a requirement that analysis of the data must be included in the BiOp, suggesting that if such analysis was instead found elsewhere in the administrative record it would be insufficient. This reads too much into *Kempthorne*, where the necessary reasoning was found in neither the BiOp nor the administrative record. *Id.* at 380 (district court searched for, but did not find, certain analyses in the BiOp or "elsewhere in the administrative record). *Kempthorne* found the content of the BiOp lacking in light of the entire AR, both of

which entirely failed to competently perform the required ESA jeopardy and habitat modification analyses. The practical fact is that a BiOp is much more accessible than the administrative record, which can be tens of thousands of pages long. *Kempthorne* did not address or decide the issue presented here.

In APA review cases, it is well established that, in determining whether agency action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.... the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error." 5 U.S.C. § 706. The "whole record," includes "everything that was before the agency pertaining to the merits of its decision." *Portland Audubon Soc'y v. Endangered Species Committee*, 984 F.2d 1534, 1548 (9th Cir. 1993). *See also Seattle Audubon Soc'y v. Lyons*, 871 F. Supp. 1291, 1308 (W.D. Wash. 1994) (finding declarations properly considered to "explain the agency's actions or to determine whether its course of inquiry was inadequate.").

DWR's cases do not undermine this reasoning. *Motor Vehicle Manufacturers Association of the United States, Inc., v. State Farm Mutual Auto Insurance Company*, 463 U.S. 29 (1983), concerned the National Highway Traffic Safety Administration's ("NHTSA") decision to rescind passive restraint crash safety requirements for new motor vehicles. When NHTSA learned that automakers opted to install automatic seatbelts which users could easily detach, the agency rescinded the order in light of the expense required to implement a program that would have only minimal safety benefits because it could be disengaged by users. *Id.* at 38-39. The Court concluded that this decision was arbitrary and capricious because NHTSA failed to consider modifying the standard to require the installation of airbags. *Id.* at 46. In reaching this conclusion, the Court indicated it must "consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment." *Id.* (emphasis added).

Focusing on *State Farm's* use of the word "decision," DWR asserts that all relevant factors must be considered in the text of the agency's decision document, rather than elsewhere in the administrative

record. But, *State Farm* also emphasized that the relevant statue required a "record of the rulemaking proceedings to be compiled," *id.* at 43-44, and indicated that "Congress established a presumption against.... changes in current policy that are not justified by the rulemaking record," *id.* at 43. *State Farm* does not support DWR's position that the "whole record" rule should be ignored in favor of a requirement that any and all analytical reasoning must be included in the decision document (the BiOp).

DWR also relies on *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168-69 (1962), which criticized the Interstate Commerce Commission's ("ICC") failure to make any findings or include any analysis to justify a particular decision. The Court noted that "expert discretion is the lifeblood of the administrative process, but unless we make the requirements for administrative action strict and demanding, expertise, the strength of modern government, can become a monster which rules with no practical limits on its discretion." *Id.* at 167 (internal citations and quotations omitted). *See also Ry. Labor Executives' Ass'n v. ICC*, 784 F.2d 959, 974 (refusing to "rummage around in the record below to find a plausible rationale to fill the void in the agency order under review"). *Burlington* and *Railway Labor Executives'* insistence upon formal findings is unsurprising given that, under the procedures applicable in that case, where the ICC was required to "make findings that support its decision, and those findings must be supported by substantial evidence." *Id.* No such general findings requirement exists here. Rather, the only findings explicitly required by the Consultation Handbook are those concerning the capacity of any RPA to prevent jeopardy and/or adverse modification.

A statute or regulation may specifically require certain reasoning or findings to be included in the ultimate decision document. The above-mentioned requirement that the BiOp explain why each part of a multi-part RPA ensures against jeopardy or adverse modification is one such example. However, there is no parallel requirement that FWS certify or make findings with respect to the other three RPA requirements on the fac[e] of the record. It is not appropriate for a court to "create[] a requirement not found in any

> relevant statute or regulation." *The Lands Council v. McNair*, 537 F.3d 981, 991 (9th Cir. 2008). Rather, the issue of whether FWS properly promulgated the RPA must be decided on the basis of the entire record.

Doc. 354 at 38-51 (footnotes omitted, emphasis in original). Plaintiffs' argument that the three non-jeopardy factors must be explicitly analyzed on the face of the BiOp was rejected, but the question of how the three non-jeopardy factors must be treated elsewhere in the record was left open. Must an explicit analysis of the three factors be included in the record? Or may evidence in the record itself, even absent explicit analysis, be relied upon to evaluate whether the RPA satisfies the three factors? The October 15, 2009 Decision recognizes a dichotomy in the caselaw:

> On the one hand, an agency action may be upheld even if it is of "less than ideal clarity" as long as "the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc.*, 419 U.S. 281, 285-86 (1974). However, a court "cannot infer an agency's reasoning from mere silence..." but must "rely only on what the agency actually said...." *Compare Gifford Pinchot Task Force v. U.S. Fish and Wildlife Serv.*, 378 F.3d 1059, 1072 n.9 (9th Cir. 2004) (holding that the court "may only rely on what the agency said in the record to determine what the agency decided and why"); *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS*, 426 F.3d 1082, 1092 (9th Cir. 2005) ("*PCFFA II*") (citing *Gifford Pinchot* for the proposition that a court must "rely only on what the agency actually said in the biological opinion").

Id. at 39.

Defendants acknowledge that the agency must explicitly analyze the jeopardy factor, but claim that it is permissible for

the agency not to address the non-jeopardy factors anywhere in the administrative record. To accept Defendants' view would be to abdicate the judicial review function. Even though the jeopardy factor is the "guiding standard" for the adoption of an RPA, *see Greenpeace*, 55 F. Supp. 2d at 1268, this does not eviscerate the other three § 402.02 factors. *Greenpeace* rejected the contention that the "economically and technologically feasible" language required the agency to "balance the benefit to the species against the economic and technical burden on the industry before approving an RPA," because such a conclusion would be inconsistent with the purposes of the ESA under *TVA v Hill*. *Id*. *Greenpeace* confirms that 50 C.F.R. § 402.02 "contains four distinct requirements for any valid RPA," *id*. at 1264, and that FWS "must come up with [RPAs] that are consistent with the purposes of the underlying action and the action agency's authority, that are economically and technologically feasible, and which avoid the likelihood of jeopardy and adverse modification." *Id*.

According to *PCFFA*, a court should "sustain an agency action if the agency has articulated a rational connection between the facts found and the conclusions made." 426 F.3d at 1090 (citing *Motor Vehicle Mfrs. Ass'n,* 463 U.S. at 43).

> "Even when an agency explains its decision with 'less than ideal clarity,' a reviewing court will not upset the decision on that account 'if the agency's path may reasonably be discerned.'" *Alaska Dep't of Envt'l*

> *Conserv. v. EPA*, 540 U.S. 461, 497 (2004) (quoting Bowman *Transp., Inc. v. Arkansas-Best Freight Sys., Inc.*, 419 U.S. 281, 286 (1974))
>
> While our review is deferential, our inquiry must "be searching and careful." *Marsh*, 490 U.S. at 378. We must determine whether the agency's decision was "based on a consideration of the relevant factors and whether there has been a clear error of judgment." *Id.*

Id. Here, the agency has articulated absolutely no connection between the facts in the record and the required conclusion that the RPA is (1) consistent with the purpose of the underlying action; (2) consistent with the action agency's authority; and (3) economically and technologically feasible. The record here is not just an explanation of "less than ideal clarity." There is no explanation at all

Defendants offer a number of post hoc rationalizations for the RPA. Defendant-Intervenors argue that the record demonstrates the RPA can be implemented in a manner consisted "with the intended purpose of the action" and "within the scope of the Federal agency's legal authority and jurisdiction," because, by letter dated December 15, 2008, the Bureau "provisionally accept[ed]" most portions of the RPA and stated that Components 3 and 4 "both need additional review and refinement before Reclamation will be able to determine whether implementation of these actions by the Projects is reasonable and prudent." *NRDC v. Kempthorne*, 1:05-cv-01207 OWW GSA, Doc. 767-1. Defendant-Intervenors conclude that the Bureau has made no

determination that the RPA is inconsistent with the purpose of the action or with its legal authority and jurisdiction. Doc. 661-3 at 38. They suggest as to economic and technological feasibility, that these requirements must have been considered because, based on concerns expressed by the Bureau, the RPA was modified to be more flexible.[46] *Id.* at 37.

But, the record provides none of these explanations.[47] FWS is ultimately responsible to ensure that the record supports the RPA. FWS explained in the preamble to its final rule adopting the Joint Consultation Regulations:

> [I]n those instances where the Service disagrees with a Federal agency's assessment of the reasonableness of its alternatives, the Service must reserve the right to include those alternatives in the biological opinion if it determines that they are "reasonable and prudent" according to the standards set out in the definition in

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[46] For example, OMR flows under Components 1 and 2 are to be calculated based on a 14-day running average, compared to the 7-day average under the interim remedial order. *See* BiOp at 168, 280-82. The turbidity trigger for Action 1 of Component 1 is now based on a 3-day average at three stations in the Delta, compared to one station under the Court's interim remedial order, to "better reflect a Delta-wide change in turbidity than one station which may be prone to localized conditions." BiOp at 281, 347.

[47] The specific requirements of the X2 action are another example of how the record fails to address the "consistentcy with the intended purpose of the action," and is "within the scope of the … agency's authority and jurisdiction." 50 C.F.R. § 402.02. Because of competing demands for water from the Projects, combined with a limited supply, one purpose of the Projects is to ensure that that water use and allocation be carefully managed, and to also ensure that water is put to a beneficial use and not wasted. This purpose is, in fact, required by California law, Cal. Const. art. X, § 2; Cal. Water Code § 275, and imposed upon federal project operations by virtue of Section 8 of the Reclamation act of 1902. 43 U.S.C. § 383. The Projects will have to expend hundreds of thousands of acre feet of water to maintain X2 as far seaward as Component 3 requires. Miller Decl., Doc. 400, at ¶¶ 67-73. Less water would be required if X2 did not need to be pushed so far downstream–water would then be available for other uses. Yet nothing in the BiOp or the record explains why it is essential that X2 be moved seaward to the degree required by Component 3 in order to protect the smelt and its habitat.

> § 402.02; the Service cannot abdicate its ultimate duty to formulate these alternatives by giving Federal agencies control over the content of a biological opinion.

51 Fed. Reg. 19,926, 19,952 (June 3, 1986). Even if, *arguendo*, the RPA is consistent with the multiple purposes of the action and the agency's statutory authority, and is economically and technologically feasible to implement, the APA requires, and the public is entitled under the law to receive, some exposition in the record of why the agency concluded (if it did so at all) that all four regulatory requirements for a valid RPA were satisfied. The RPA Actions manifestly interdict the water supply for domestic human consumption and agricultural use for over twenty million people who depend on the Projects for their water supply. "Trust us" is not acceptable. FWS has shown no inclination to fully and honestly address water supply needs beyond the species, despite the fact that its own regulation requires such consideration.

How the appropriation of water for the RPA Actions, to the exclusion of implementing less harmful alternatives, is required for species survival is not explained. The appropriate remedy for such a failure to explain is remand to the agency. *See Sears Sav. Bank v. Federal Sav. and Loan Ins. Corp*. 775 F.2d 1028, 1030 (9th Cir. 1985) ("If the administrative record is inadequate to explain the action taken, the preferred practice is to remand to the agency for amplification."). Plaintiffs' motion for

summary judgment that FWS violated § 402.02 is GRANTED; Defendants' cross-motion is DENIED.

c. There is no Procedural Requirement that FWS Accept, Consider, and/or Address Comments Regarding the BiOp or its RPA.

Neither the ESA nor its implementing regulations require an opportunity for public comment or that FWS respond to any comments received. *See Kandra v. United States*, 145 F. Supp. 2d 1192, 1209 n.8 (D. Or. 2001) ("as the government correctly pointed out during oral argument, the ESA does not require public review or input during the consultation process"); *Ctr. for Biological Diversity v. Kempthorne*, 2008 WL 659822, *7 (D. Ariz. Mar. 6, 2008) ("Biological opinions, unlike DPS findings, are not subject to notice and comment rulemaking procedures pursuant to the ESA."). Plaintiffs' suggestion that FWS violated the ESA by "ignoring" comments on the draft BiOp is legally unsustainable. Plaintiffs' motion on this ground is DENIED; Defendants' cross-motion is GRANTED.

C. Stewart & Jasper Orchards' Argument Re: Reasonable and Prudent Measures.

Stewart & Jasper Orchards, et al., ("Stewart & Jasper") allege that FWS's failure to consider the economic impacts of implementing the reasonable and prudent measures ("RPMs") is arbitrary and capricious. Doc. 551 at 68 n. 24. Whenever FWS offers reasonable and prudent alternatives to avoid jeopardy to a

species, it must also specify "those reasonable and prudent measures that [FWS] considers necessary or appropriate to minimize" incidental taking of the species. 16 U.S.C. § 1536(b)(4)(C)(ii). Stewart & Jasper argues that by formulating RPMs that it believes "are necessary and appropriate to minimize the effect of the proposed action on the delta smelt," without "provid[ing] a statement that allows for Reclamation to take into consideration the economic impacts of implementing the RPMs," *see* BiOp at 294, FWS has allegedly "arbitrarily left open the question of whether the RPMs are in fact reasonable, necessary, and appropriate in light of the harm that their implementation will cause." Doc. 551 at 68 n. 24.

This argument is unsupported in law. Unlike 50 C.F.R. § 402.02's definition of a RPA, which provides that RPAs must be "economically and technologically" feasible, the regulatory definition of RPM lacks such language:

> Reasonable and prudent measures refer to those actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take.

50 C.F.R. § 402.02. Even if the definition of RPM included an economic feasibility requirement, this language does not require that FWS "balance the benefit to the species against the economic and technical burden on the industry before approving an RPA," because such a conclusion is inconsistent with the purposes of the ESA under *TVA v Hill*. *Greenpeace*, 55 F. Supp. 2d at 1267.

Stewart & Jasper's motion for summary judgment regarding the lawfulness of the RPMs for failure to consider economic effects is DENIED; Federal Defendants and Defendant-Intervenors' cross-motions are GRANTED.

D. Stewart & Jasper, et al.'s, Argument that FWS Illegally Arrogated Authority to Itself Over Bureau of Reclamation and California Department of Water Resources Operations.

The Stewart & Jasper Plaintiffs raise a novel argument that FWS "illegally arrogated" authority to itself over Reclamation and DWR, by "claim[ing] the ability to oversee [Project operations] indefinitely," rather than "advis[ing] Reclamation and DWR on how to avoid jeopardizing the delta smelt and destroying or adversely modifying its critical habitat." Doc. 551 at 80:

> In RPA Component 1, for example, FWS not only set forth actions "designed to reduce the delta smelt entrainment losses," but also stated that "[t]hroughout the implementation of RPA Component 1, FWS will make the final determination as to OMR flows required to protect delta smelt." BiOp at 280-81. Likewise, in RPA Component 2 that FWS "shall make the final determination regarding specific OMR flows," BiOp at 282, as well as the FWS' reasonable and prudent measures. See BiOp at 294 (noting that FWS "shall have the final decision on the operations of the Permanent Gates" and that the members of the Gate Operations Review Team "can provide suggestions to operate the gates, but the ultimate decision on how to operate the gates to protect delta smelt will be made by the Service").

Id.

Stewart & Jasper argue that this is unlawful because the ESA "does not give the FWS the power to order other agencies to

comply with their requests or to veto their decisions." *Id.* (citing *Sierra Club v. Marsh*, 816 F.2d 1376, 1386 (9th Cir. 1987)). The law is clear that FWS has no such authority, nor can FWS, as consulting agency, act *ultra vires* to usurp the operational authority of the Bureau and DWR over the Projects. The November 13, 2009 Decision found: "the action agency retains the ultimate responsibility for deciding whether, and how, to proceed with the proposed action after Section 7 consultation." Doc. 399, Mem. Decision re Cross-Motions for Summary Judgment on NEPA Issues, at 23-24 n.7. Even if FWS issues an RPA with specific requirements following a jeopardy or adverse modification finding, the action agency remains free to disregard such requirements, and FWS has no enforcement authority absent an ESA violation. Reclamation and DWR have provisionally adopted the RPA and have implemented many of its Actions, but the record does not show FWS employees have "claimed the ability to oversee these agencies indefinitely." Doc. 551 at 80.

Stewart & Jasper's contention that FWS's reserved to itself "an ongoing power of oversight, as well as a power to dictate new and different pumping restrictions," assumes that neither Reclamation, as action agency, nor DWR, as co-operator, have the ability to not comply with the RPA. Doc. 697 at 87. Reclamation is not legally compelled to blindly follow FWS's pronouncements. Reclamation retains the authority to reject the RPA at any time,

subject to its obligation to reinitiate consultation. Although FWS has not yet demonstrated a willingness or capability to protect interests other than the species, it cannot be assumed that Reclamation will not lawfully discharge its statutory water supply responsibilities.

Stewart & Jasper's motion for summary judgment regarding FWS's alleged unlawful arrogation of authority is DENIED; Federal Defendants and Defendant-Intervenors' cross-motions are GRANTED.

E. Information Quality Act Claim.

Family Farm Alliance ("FFA") Plaintiffs claim that Federal Defendants did not apply the IQA and its implementing guidelines in preparing and disseminating the BiOp.

(1) Legal Framework of the IQA.

The IQA provides in its entirety:

> (a) IN GENERAL.--The Director of the Office of Management and Budget shall, by not later than September 30, 2001, and with public and Federal agency involvement, issue guidelines under sections 3504(d)(1) and 3516 of title 44, United States Code, that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies in fulfillment of the purposes and provisions of chapter 35 of title 44, United States Code, commonly referred to as the Paperwork Reduction Act.
>
> (b) CONTENT OF GUIDELINES.--The guidelines under subsection (a) shall--
>
> > (1) apply to the sharing by Federal agencies of, and access to, information disseminated by Federal

> agencies; and
>
> (2) require that each Federal agency to which the guidelines apply--
>
> (A) issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency, by not later than 1 year after the date of issuance of the guidelines under subsection (a);
>
> (B) establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the guidelines issued under subsection (a); and
>
> (C) report periodically to the Director--
>
> (i) the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency; and
>
> (ii) how such complaints were handled by the agency.

Pub. L. 106-554, 114 Stat 2763, 2763A-153-2763A-154 (2000) (codified at 44 U.S.C. § 3516).

Subsection (a) mandates that the Office of Management and Budget ("OMB") issue, by no later than September 30, 2001, government-wide guidelines to ensure the "quality, objectivity, utility, and integrity of information" disseminated by federal agencies. *See* Pub. L. No. 106-554, § 515(a) (2000). The statute itself contains no substantive provisions regarding information quality, leaving the structure and design of any such

requirements to OMB. There is no relevant legislative history disclosing substantive Congressional intent regarding information quality.

Within one year of OMB's issuance of Guidelines, each federal agency was required to issue its own guidelines consistent with OMB's. *Id.* at § 515(b)(2)(A). OMB, the Department of the Interior, and FWS timely issued the required guidelines. *See, e.g.*, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, 67 Fed. Reg. 8,452 (Feb. 22, 2002) ("OMB IQA Guidelines"); Information Quality Guidelines of the U.S. Department of the Interior, 67 Fed. Reg. 50,687 (Aug. 5, 2002)) ("DOI IQA Guidelines"); FWS Information Quality Guidelines ("FWS IQA Guidelines")[48]. The IQA specifically required agencies to "establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency...." and to "report periodically" on "the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency" and "how such complaints were handled by the agency." *Id.* at § 515(b)(2)(B)&(C)(emphasis added).

FWS's own IQA Guidelines are specific to its activities and disseminations, including biological opinions, and state that in

[48] Available at http://www.fws.gov/informationquality/topics/IQAguidelines-final82307.pdf (last visited August 11, 2010).

order to ensure objectivity of information disseminated, the information will be presented in an "accurate[]," "clear[]," "complete[]," and "unbiased" manner. FWS IQA Guidelines III-8. In addition, FWS' IQA Guidelines require that a "preparer of a highly influential assessment or of influential information ... document the strengths and weaknesses of the data underlying the assessment/information so that the reader will understand the context for the FWS decision." *Id.* at § VI-10. Plaintiffs maintain that FWS failed to comply with these guidelines because the "effects of the BiOp were assumed, not supported by data and objective and scientific analyses." Doc. 551 at 82.

(2) Right to Judicial Review Under the APA.

Federal Defendants and Defendant Intervenors raise a threshold objection, arguing that there is no right of judicial review under the IQA.

It is undisputed that the IQA provides no private right of action. A party challenging an administrative agency's compliance with a substantive statute that lacks an internal private right of action must seek judicial review under the APA. *See Lujan v. Nat'l Wildlife Fed'n*, 497 U.S. 871, 882 (1990); *Village of False Pass v. Clark*, 733 F.2d 605, 609 (9th Cir. 1984) (because ESA contains no internal standard of review, APA § 706 governs review of actions brought under the ESA).

The APA authorizes suit by a plaintiff "suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute." 5 U.S.C. § 702. There is a presumption of reviewability under the APA. *Shalala v. Illinois Council on Long Term Care, Inc.*, 529 U.S. 1, 44 n.11 (2000). However, the APA expressly precludes judicial review where: (1) any statute "precludes judicial review"; or (2) "agency action is committed to agency discretion by law." 5 U.S.C. § 701(a). If either of these exceptions applies, the lawsuit cannot proceed under the APA.

If neither exception applies, the APA permits judicial review of "[a]gency action made reviewable by statute and final agency action for which there is no other adequate remedy in a court...." 5 U.S.C. § 704. Where a statute lacks an internal judicial review provision, the "agency action made reviewable by statute" language is inapplicable, requiring the existence of a "final agency action." "Agency action" is defined to include "the whole or a part of an agency rule, order, license, sanction, relief, or the equivalent or denial thereof, or failure to act." 5 U.S.C. § 551(13). The APA requires that the agency action be upheld unless it is found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," or "without observance of procedure required by law." 5 U.S.C. §

706(2).

a. APA § 702(a)(2)'s Exception for Agency Action "Committed to Agency Discretion by Law" Bars Judicial Review in this Case.

FFA does not allege that any statute expressly precludes judicial review of FFA's IQA claim. The issue is whether the IQA and/or its implementing guidelines, by law, commit to agency discretion the disputed agency actions challenged by Plaintiff's claim.

The general test for when an action is "committed to agency discretion by law" under the APA is whether there is "no law to apply." *Heckler v. Chaney*, 470 U.S. 821, 830 (1985) (internal quotation marks omitted). "Agency action is committed to the discretion of the agency by law when 'the statute is drawn so that a court would have no meaningful standard against which to judge the agency's exercise of discretion.'" *Steenholdt v. FAA*, 314 F.3d 633, 638 (D.C. Cir. 2003) (quoting *Heckler*, 470 U.S. at 830). "If no 'judicially manageable standard' exists by which to judge the agency's action, meaningful judicial review is impossible and the courts are without jurisdiction to review that action." *Id.* Here, the IQA itself contains absolutely no substantive standards, let alone any standards relevant to the claims brought in this case concerning the timing of responses to Requests and Appeals and the makeup of peer review panels. The statute itself commits the challenged agency actions to the

agency's discretion.

However, even "[w]here an action is committed to absolute agency discretion by law, ... courts have assumed the power to review allegations that an agency exceeded its legal authority, acted unconstitutionally, or failed to follow its own regulations." *United States v. Carpenter*, 526 F.3d 1237, 1242 (9th Cir. 2008); *see also Padula v. Webster*, 822 F.2d 97, 100 (9th Cir. 1987)("Judicially manageable standards may be found in formal and informal policy statements and regulations as well as in statutes, but if a court examines all these possible sources and concludes that there is, in fact, 'no law to apply,' judicial review will be precluded.")(quoting *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 410 (1971)). The critical issue is: Do the agency's own regulations create meaningful standards or do they preserve the discretion afforded by the statute?

Salt Institute v. Thompson, 345 F. Supp. 2d 589 (E.D. Va. 2004), aff'd sub nom. on alternate grounds, *Salt Inst. v. Leavitt*, 440 F.3d 156 (4th Cir. 2006), applied 701(a)(2) and *Steenholdt* to the IQA, finding that "[n]either the IQA nor the OMB Guidelines provide judicially manageable standards that would allow meaningful judicial review to determine whether an agency properly exercised its discretion in deciding a request to correct a prior communication." With respect to the request for

correction at issue in *Salt Institute*:

> [T]he guidelines provide that "[a]gencies, in making their determination of whether or not to correct information, may reject claims made in bad faith or without justification, and are required to undertake only the degree of correction that they conclude is appropriate for the nature and timeliness of the information involved." 67 Fed. Reg. at 8458. Courts have determined that regulations containing similar language granted sufficient discretion to agencies to preclude judicial review under the APA. *See Steenholdt*, 314 F.3d at 638 (holding that agency's decision under a regulation allowing an agency to take an action "for any reason the Administration considers appropriate" is committed to agency discretion and not reviewable under APA). Judicial review of [the agency's] discretionary decisions is not available under the APA because the IQA and OMB guidelines at issue insulate the agency's determinations of when correction of information contained in informal agency statements is warranted.

Id. at 602-603. Do the IQA Guidelines create meaningful standards regarding the content of a biological opinion, or do the Guidelines preserve agency discretion over these procedural matters?[49]

Plaintiffs' attempt to distinguish *Salt Institute* on the ground that, in preparing and disseminating "highly influential"

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[49] Plaintiffs attempt to distinguish the many cases that have found no right to judicial review under the IQA on the ground none of them involved "final agency action" cognizable under the APA, which provides for judicial review of a "final agency action for which there is no other adequate remedy in a court ...." 5 U.S.C. § 704. Plaintiffs are correct that the relevant cases do not concern "final agency actions," for purposes of the APA. For example, *Salt Institute* involved the issuance of information about a trial study, an action the district court found was not "a final agency action necessary for judicial review under the APA." 345 F. Supp. 2d at 602. Here, the issuance of the BiOp is indisputably final agency action. However, "final agency action" is a necessary but not sufficient prerequisite to judicial review under the APA. Judicial review may also be precluded where there is no "judicially manageable standard" by which to judge the agency's action. *Heckler v. Chaney*, 470 U.S. at 830.

scientific documents, the agency is mandated to follow a scientific approach to develop the best available scientific data used in that document. Specifically, Plaintiffs reference FWS IQA Guidelines VI-10, which provide:

> VI – 10 How will FWS describe the strengths and weaknesses of the data used in influential scientific information and highly influential scientific assessments?
>
> The preparer of a highly influential assessment or of influential information will document the strengths and weaknesses of the data underlying the assessment/information so that the reader will understand the context for the FWS decision. The narrative will be contained in the administrative record of the issue under consideration. The documentation may be done in a narrative that includes a complete literature cited section, and an assessment of the strengths and weaknesses of the information used for advising the decision at hand. The narrative's form and length is left to the preparer. The following bullet points provide questions to consider in the narrative.
>
> - What types of research studies does the assessment/information rely upon (e.g. experimental studies with controls, statistically designed observational studies that test hypotheses, monitoring studies, information synthesis, professional judgment etc.)?
> - How recent is the research?
> - What are the sources for the underlying data that support the assessment/information (e.g. peer reviewed article reporting primary data or data synthesis, unpublished peer reviewed reports, on-line publication, textbook, personal communication etc.)?
> - Which of the sources were most crucial to the conclusions reached in the assessment/information?

- What type of review did each source receive (anonymous independent peer review, external peer review, agency review, public review and comment etc.)?

- Were the reviewers independent of the FWS? Were the reviewers independent of individuals or groups advocating a certain course of action by FWS?

- Were the reviews in compliance with OMB M-05-03, "Final Information Quality Bulletin for Peer Review"?

Two examples of how one might provide such a characterization are provided below:

> Example 1: (A number of references are listed.) These references were the primary sources of data that provided the basis for the decision. They are peer reviewed studies with an experimental design that includes controls and testable hypotheses. They were completed within the last 5 years and were independently reviewed by non-FWS personnel and published in scientific journals.
>
> Example 2: (A number of references are listed.) These references were articles and sources of data that provided specific data points that were included in the decision document, but by themselves did not primarily contribute to the decision. These citations are a combination of fact sheets, summaries of information, professional judgments, and personal communications that have not been peer reviewed. Most of the data is current (within the last 7 years).

Although this biological opinion is undoubtedly the type of "influential document"[50] to which this provision applies,

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[50] The FWS IQA Guidelines further state that the term "influential, when used in the phrase 'influential scientific, financial, or statistical information,' means that [FWS] can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on

Plaintiffs' overreach by suggesting that these guidelines require the agency to follow any particular scientific approach to the development of the best available scientific data used in a BiOp. All that this guideline affirmatively requires is that the agency prepare some kind of "narrative" that documents the strengths and weaknesses of the data upon which the document relies. There are no other "judicially manageable standards" included in this guideline.

Under this guideline provision, Plaintiffs have not claimed that no such narrative was prepared.[51] But, that is not the thrust of any of the IQA claims in this case, which seek to impose substantive standards on the presentation, use, and analysis of data by FWS. None of the guidelines cited by Plaintiffs set forth any "judicially manageable standards" against which the presentation, use, or analysis of data can be measured. The FWS guidelines disclaim any intent to do so or any right to judicial review. There is no right to judicial review of Plaintiffs' IQA claims. FFA's motion for summary judgment is

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important public policy or private sector decisions, and thus, a decision or action to be taken by the Director.... As a general rule, FWS considers an impact clear and substantial when a specific piece of information or body of information is a principal basis for a FWS position." FWS IQA Guidelines, § III-10.

[51] Whether such a claim would be subject to judicial review is not clear. The guidelines specify that they are "intended only to improve the internal management of FWS relating to the [IQA]. Nothing in these guidelines is intended to create any right or benefit, substantive or procedural, enforceable by law or equity against the United States, its agencies, its offices, or another person. These guidelines do not provide, in any by themselves, any right to judicial review." FWS IQA Guidelines Part IV.

DENIED. Federal Defendants' cross motion is GRANTED.

(3) To the Extent FFA Bases Any of its Claims against Reclamation on the ESA, Such Claims are Subject to the ESA's Pre-Filing Requirements.

To the extent FFA's IQA and ESA claims overlap, its ESA claims are subject to the ESA's pre-filing notice requirement. No suit may be commenced under the ESA "prior to sixty days after written notice of the violation has been given to the Secretary." 16 U.S.C. § 1540(g)(2)(A)(i). This requirement is jurisdictional and "[a] failure to strictly comply with the notice requirement acts as an absolute bar to bringing suit under the ESA." *Southwest Ctr. for Biological Diversity*, 143 F.3d at 520. Failure to comply with a statutory notice requirement is a jurisdictional objection that may be addressed "at any time." *See* Fed. R. Civ. P. 12(h)(3).

Here, FFA failed to notify Reclamation of its intent to sue. Plaintiffs argue that "[a]doption of a BiOp is a final agency action, and such actions are subject to judicial review under the APA," citing *Bennett v. Spear*, 520 U.S. at 178. However, allowing a plaintiff to circumvent the ESA's 60-day notice requirement by claiming that its cause of action arises under the APA would circumvent the ESA's notice requirement entirely. *Hawaii County Green Party v. Clinton*, 124 F. Supp. 2d 1173, 1193 (D. Haw. 2000).

To the extent that FFA's claims against Reclamation arise

under the ESA, their motion for summary judgment is DENIED on the ground that they failed to comply with the statutory notice requirement. Federal Defendants' and Defendant Intervenors' cross-motions are GRANTED.

F. Renewed Claim That FWS Violated NEPA.

Plaintiffs attempt to revisit the issue of whether FWS violated NEPA in issuing the BiOp and its RPA. Plaintiffs first renew an argument that was rejected in the Salmonid Consolidated cases, namely that *Ramsey v. Cantor*, 96 F.3d 434 (9th Cir. 1996), the only case in which the issuance of a biological opinion was found to violate NEPA, controls here. In *Ramsey*, the NEPA obligation was imposed on the consulting agency's issuance of a biological opinion in part because there was no federal action agency to comply with NEPA.

The November 12, 2009 NEPA decision in this case found *Ramsey* inapplicable because the action agency is Reclamation. *See* Doc. 399 at 16-17. Plaintiffs argue that the Courts' initial finding was incorrect because, here, as in *Ramsey*, the BiOp was not only imposed upon Reclamation's operations, but also upon the operations of DWR, a state agency. This argument was rejected in the Consolidated Salmonid Cases shortly after the cross-motions in the Consolidated Smelt Cases were filed. The March 5, 2010 Consolidated Salmonid Cases decision concluded:

> Plaintiffs ignore the interconnected nature of the SWP

> and CVP projects. Reclamation and DWR have, for many years, operated the projects in a coordinated manner. *See* OCAP Biological Assessment ("OCAP BA") at 1-2. The Biological Assessment ("BA"), prepared by Reclamation, describes the project for which consultation was being sought as "the ongoing operations of the CVP and SWP and potential future actions that are foreseeable to occur within the period covered by the project description." *Id*. at 1-1. The two water projects, which are jointly operated by Reclamation and DWR, share water resources, storage, pumping, and conveyance facilities to manage and deliver one third of the water supply for the State of California. Reclamation's BA provided NMFS with extensive analyses of the effects of coordinated operation of the CVP and SWP on the Listed Species.

Consolidated Salmonid Cases, 1:09-cv-1053 OWW DLB, Doc. 266 at 14 (emphasis in original). Plaintiffs offer no new law or persuasive authority compelling a finding of clear error to justify reconsideration.

Alternatively, Plaintiffs argue that "FWS's future choices with respect to OMR flows restrictions are 'major federal actions' within the scope of [NEPA's implementing regulations]." Doc. 551 at 87. This argument continues:

> [R]ather than DWR or Reclamation operating the CVP and SWP, respectively, the BiOp and its RPA have resulted in transferring operational control to FWS for up to six months year (i.e., December through June). FWS' future choices with regard to implementation of RPA Components 1 and 2 will cause distinct and separate impacts to the human environment within both the CVP and SWP service areas. Even if Reclamation shares a NEPA obligation with regard to its acceptance of the BiOp, Reclamation is not the proper federal agency to account for and analyze the environmental effects of FWS' actions that will occur within the SWP service area. These SWP impacts are solely attributable to the FWS' formulation of the RPA and its ongoing role in implementing that RPA, and they were not caused by

> **Reclamation and are beyond Reclamation's discretion or jurisdiction. FWS will continue to make weekly water use and resource allocation decisions that amount to major federal actions significantly affecting the human environment in both CVP and SWP service areas without the benefit of the information required by a proper NEPA review and without satisfying the public disclosure and accountability purposes of NEPA.**

Id.

This is an attempt to re-argue and re-frame arguments previously decided. The prior NEPA rulings determined that Reclamation bears the NEPA responsibility in this case as action agency. "Reclamation proposed the action (in the form of the Operations and Criteria Plan ('OCAP')) to FWS, which triggered the preparation of the BiOp." Doc. 399 at 28. "Reclamation was not 'bound' by the BiOp until it chose to proceed with the OCAP and implement the RPA. Once Reclamation did so, operation of the Projects became the relevant agency 'action,' and Reclamation, as action agency, is the more appropriate lead agency under NEPA." ***Id.*** **at 30. Reclamation accepted the adaptive management protocol prescribed in the RPA "as a constraint upon its operations when it provisionally accepted the RPA." Doc. 399 at 30. FWS's day-to-day decisions to implement the adaptive management protocol are a natural incident of Reclamation's decision to adopt the RPA. Moreover, FWS's setting of specific OMR flows under RPA Components 1 and 2 is based on a weekly review of salvage data, distribution, flow and turbidity levels, population status, and other information, making NEPA review of such actions**

impractical. *See Flint Ridge Dev. Co. v. Scenic Rivers Ass'n*, 426 U.S. 776, 788-89 (1976) (provision in applicable law requiring statement of record to become effective 30 days after filing made preparation of EIS "inconceivable"); *Kandra*, 145 F. Supp. 2d at 1205 (finding that "[a]n EIS takes at least several months to complete"). FWS has no legal or functional authority to operate the projects and adequate remedies exist to compel the Bureau to stop FWS, if FWS endeavors to do so.

Plaintiffs' motion for summary judgment as to FWS's liability under NEPA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motion is GRANTED.

G. Reclamation's Liability under the ESA.

Following the issuance of a biological opinion, the ESA regulations require the action agency, here, Reclamation, to "determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion." 50 C.F.R. § 402.15(a). In making that determination, a federal action agency "may not rely solely on a FWS biological opinion to establish conclusively its compliance with its substantive obligations under section 7(a)(2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy*, 898 F.2d 1410, 1415 (9th Cir. 1990). In *City of Tacoma v. Fed. Energy Regulatory Comm'n*, 460 F.3d 53, 76 (D.C. Cir. 2006), the D.C. Circuit summarized the caselaw culminating in *Pyramid Lake*:

[The] interagency consultation process reflects Congress's awareness that expert agencies (such as the [NMFS] and [FWS]) are far more knowledgeable than other federal agencies about the precise conditions that pose a threat to listed species, and that those expert agencies are in the best position to make discretionary factual determinations about whether a proposed agency action will create a problem for a listed species and what measures might be appropriate to protect the species. Congress's recognition of this expertise suggests that Congress intended the action agency to defer, at least to some extent, to the determinations of the consultant agency, a point the Supreme Court recognized in *Bennett v. Spear*, 520 U.S. 154, 169-170 (1997). In *Bennett*, the Court stated that an action agency disregards a jeopardy finding in a BiOp "at its own peril" and bears the burden of articulating the reasons for reaching its contrary conclusion. *Id.*

Accordingly, when we are reviewing the decision of an action agency to rely on a BiOp, the focus of our review is quite different than when we are reviewing a BiOp directly. In the former case, the critical question is whether the action agency's reliance was arbitrary and capricious, not whether the BiOp itself is somehow flawed. *Aluminum Co. of Am. v. Adm'r, Bonneville Power Admin.*, 175 F.3d 1156, 1160 (9th Cir.1999); *Pyramid Lake Paiute Tribe v. U.S. Dep't of Navy*, 898 F.2d 1410, 1415 (9th Cir.1990); *Stop H-3 Ass'n v. Dole*, 740 F.2d 1442, 1460 (9th Cir.1984); cf. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 422 F.3d 782, 790 (9th Cir. 2005) (direct review of a BiOp). Of course, the two inquiries overlap to some extent, because reliance on a facially flawed BiOp would likely be arbitrary and capricious, but the action agency "need not undertake a separate, independent analysis" of the issues addressed in the BiOp. *Aluminum Co.*, 175 F.3d at 1161. In fact, if the law required the action agency to undertake an independent analysis, then the expertise of the consultant agency would be seriously undermined. Yet the action agency must not blindly adopt the conclusions of the consultant agency, citing that agency's expertise. *Id.* Rather, the ultimate responsibility for compliance with the ESA falls on the action agency. 16 U.S.C. § 1536(a) (1)-(2). In Pyramid Lake, the Ninth Circuit balanced these two somewhat inconsistent principles and articulated the following

rule:

> [E]ven when the [consultant agency's] opinion is based on "admittedly weak" information, another agency's reliance on that opinion will satisfy its obligations under the Act if a challenging party can point to no "new" information- i.e., information the [consultant agency] did not take into account-which challenges the opinion's conclusions.

898 F.2d at 1415; *see also Defenders of Wildlife v. U.S. EPA*, 420 F.3d 946, 959, 976 (9th Cir. 2005); *Stop H-3 Ass'n*, 740 F.2d at 1459-60.

City of Tacoma, 460 F.3d at 75-76. The D.C. Circuit rejected the City of Tacoma's claim that the consultant agency in that case, FERC, was liable under the ESA because the City had not "presented FERC with new information that was unavailable to [NMFS] or [FWS] and that would give FERC a basis for doubting the expert conclusions in the BiOps those agencies prepared." *Id.* at 76.

Here, Plaintiffs attempt to side-step this standard, arguing that Reclamation should have independently recognized and addressed specified errors in the BiOp. For example, they argue Reclamation should have recognized the error caused by comparing CALSIM data to non-CALSIM Data because Reclamation had extensively analyzed the use of CALSIM in the BA. *See* AR 010698-010807. The BA stated:

> The simulation results of the OCAP BA are designed for a comparative evaluation because the CALSIM-II model uses generalized rules to operate the CVP and SWP systems and the results are a gross estimate that may

> not reflect how actual operations would occur.... Results should only be used as a comparative evaluation to reflect how changes in facilities and operations may affect the CVP-SWP system.

AR 010701. FWS took this information into account in the BiOp. *See* BiOp at 204-206, reviewing Calsim II modeling performed in the BA. Plaintiffs have not demonstrated that Reclamation was in possession of any "new information" not considered by FWS that provided Reclamation a basis for questioning the BiOp's expert conclusions. Absent such a showing, even though the BiOp is flawed in many ways, Reclamation could rely upon it without incurring ESA liability.

VIII. CONCLUSION

It cannot be disputed that the law entitles the delta smelt to ESA protection. It is significant that the co-operator of the Projects, DWR, in its endeavors to protect a substantial part of the State's water supply, opposes as unjustified and based on bad science some of the RPA Actions. It is equally significant that despite the harm visited on California water users, FWS has failed to provide lawful explanations for the apparent over-appropriation of project water supplies for species protection. In view of the legislative failure to provide the means to assure an adequate water supply for both the humans and the species dependent on the Delta, the public cannot afford sloppy science and uni-directional prescriptions that ignore California's water needs. A court is bound by the law. Resource allocation and

establishing legislative priorities protecting the environment are the prerogatives of other branches of government. The law alone cannot afford protection to all the competing interests at stake in these cases.

For all the reasons set forth above:

(A) Plaintiffs' and DWR's motions for summary judgment that the BiOp violates the ESA and the APA are GRANTED IN PART AND DENIED IN PART; and Federal Defendants' and Defendant Intervenors' cross-motions are GRANTED IN PART AND DENIED IN PART based on the following findings:

(1) It was not arbitrary, capricious, or clear error for FWS to base its jeopardy conclusion in part on Kimmerer (2008)'s predictions of relative increases in delta smelt entrainment.

(2) FWS's failure to apply a quantitative life-cycle model to evaluate the impacts of Project operations on the smelt did not violate the ESA.

(3) The BiOp's reliance on analyses using raw salvage figures to set the upper and lower OMR flow limits of Actions 1, 2, and 3 was arbitrary and capricious and represents a failure to use the best available science. Actions 1, 2, and 3 depend so heavily on these flawed analyses that this failure is not harmless. Remand is necessary.

(4) Comparison of Calsim II to Dayflow model runs created potentially material bias in the BiOp's evaluation of the impacts of Project operations on the position of X2 and related conclusions regarding population dynamics and habitat. FWS's failure to address or explain this material bias represents a failure to consider and evaluate a relevant factor and violates the ESA and APA. Remand is required.

(5) The use of Dayflow to represent the baseline did not improperly attribute past effects to the Projects.

(6) The flawed Calsim II to Dayflow comparison fatally taints the justification provided for Action 4. Remand is required.

(7) Plaintiffs' argument that Action 4 is unlawful because it is an "untested hypothesis" is an unfounded interpretation of the scientific method.

(8) FWS's reliance on Feyrer (2007), Feyrer (2008), and Bennett (2005) was not arbitrary, capricious, or clear error.

(9) The best science available at the time the BiOp issued supports the conclusion that X2 is a valid surrogate for delta smelt habitat.

(10) Plaintiffs' argument that FWS violated the best available science standard because the smelt are not

habitat limited is unfounded. The BiOp admits the delta smelt may not be habitat limited, but reasonably concludes that the species has become increasingly habitat limited over time, contributing to the population's decline, and that worsening habitat conditions may limit smelt recovery.

(11) FWS's use of a linear stock-recruit model, although scientifically criticized, was not arbitrary, capricious, or clear error.

(12) The BiOp has failed to sufficiently explain why maintaining X2 at 74 km (following wet years) and 81 km (following above normal years), respectively, as opposed to any other specific location, is essential to avoid jeopardy and/or adverse modification. Remand is required.

(13) Federal Defendants' reliance on turbidity as one of several triggers for Action 1 was not arbitrary, capricious, or clear error.

(14) Plaintiffs' argument that FWS violated the ESA and/or the APA by excluding data from 2007 in its analysis of entrainment effects, but including it in its calculation of the ITL is without merit. FWS offered a reasonable explanation for these choices.

(15) The BiOp provides a reasonable explanation for why

the 2006-2008 year range was used to calculate the adult delta smelt ITL, but unlawfully fails to explain why 2005 was added to the juvenile ITL calculation. Remand is required.

(16) The BiOp also fails to explain why FWS chose to set the ITL based on the average cumulative salvage index for the years selected. FWS shall explain this choice on remand.

(17) In general, the BiOp's conclusions about the causal connections between Project Operations and "other stressors" are ambiguous. However, the BiOp's assertion that Project Operations contribute to and/or exacerbate the impacts on delta smelt of predation, aquatic macrophytes, and microcystis are unsupported by record evidence and/or explanation. Remand is required.

(18) The record does not support the BiOp's conclusion that food web and pollutants/contaminant impacts are indirect effects of Project operations. Remand is required.

(19) Plaintiffs' omnibus challenge to the substance of the critical habitat analysis fails. However, the critical habitat analysis does not specifically explain its conclusion that Project operations are reasonably

certain to exacerbate the impact of contaminants to delta smelt habitat. In addition, because critical habitat conclusion 3(c) explicitly relies upon the flawed analysis regarding the movement of X2, this conclusion is without support in the record and is arbitrary and capricious. Remand is required.

(20) Although there is record support for the BiOp's conclusion that Project operations are likely to jeopardize the continued existence and/or adversely modify the critical habitat of the delta smelt, the analyses supporting the specific flow prescriptions set forth in the RPA are fatally flawed and predominantly unsupported. The BiOp does not justify or explain its attribution to Project operations adverse impacts caused by others stressors. When combined, the totality of these failures demand remand to the agency for further consideration and explanation.

(B) Plaintiffs' motion for summary judgment that the BiOp does not segregate discretionary from nondiscretionary actions is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(C) Plaintiffs' motion for summary judgment that the BiOp does not undertake the analysis required by 50 C.F.R. § 402.02 is GRANTED; Federal Defendants' and Defendant-

Intervenors' cross motions are DENIED. The BiOp completely fails to analyze economic feasibility, consistency with the purpose of the action, and consistency with the action agency's authority demanded by § 402.02. Further analysis in compliance with § 402.02 is required on remand.

(D) Plaintiffs' motion for summary judgment that FWS did not address comments on the draft BiOp is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(E) Stewart & Jasper's motion for summary judgment that the BiOp failed to consider the economic impacts of promulgating the RPMs is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(F) Stewart & Jasper's motion for summary judgment that FWS illegally arrogated authority to itself over Reclamation and DWR is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(G) Family Farm Alliance's motion for summary judgment on its IQA claim is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(H) Plaintiffs' renewed motion for summary judgment that FWS violated NEPA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(I) Plaintiffs' motion for summary judgment that Reclamation

violated the ESA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

The 2008 BiOp and its RPA are arbitrary, capricious, and unlawful, and are remanded to FWS for further consideration in accordance with this decision and the requirements of law. Plaintiffs shall submit a form of order consistent with this memorandum decision within five (5) days of electronic service.

A status conference is set for January 4, 2011, at 12:00 noon, in Courtroom 3 (OWW), to address any need for further proceedings.

SO ORDERED

Dated: December 14, 2010

/s/ Oliver W. Wanger
Oliver W. Wanger
United States District Judge