

IN THE COURT OF APPEALS OF THE STATE OF WASHINGTON

DIVISION II

NORTHWEST SPORTFISHING INDUSTRY
ASSOCIATION, ASSOCIATION OF
NORTHWEST STEELHEADERS, PACIFIC
COAST FEDERATION OF FISHERMEN'S
ASSOCIATIONS, INSTITUTE FOR
FISHERIES RESOURCES, and IDAHO
RIVERS UNITED,

Appellants,

v.

WASHINGTON DEPARTMENT OF
ECOLOGY,

Respondent,

and

NORTHWEST RIVER PARTNERS,

Intervenor-Respondent.

No. 42364-2-II

PUBLISHED OPINION

Hunt, J. — Northwest Sportfishing Industry Association, Association of Northwest Steelheaders, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, and Idaho Rivers United (Northwest Sportfishing) appeal the State of Washington

Department of Ecology's refusal to initiate rulemaking to modify water quality standards for Total Dissolved Gas (TDG)¹ in the Columbia and Snake Rivers,² arguing that Ecology's denial was arbitrary and capricious.³ Ecology and intervener Northwest Riverpartners respond that Ecology's denial of rulemaking was the product of a reasoned decision making process.⁴ Underlying the issues in this appeal are Northwest Sportfishing and others' efforts to improve the survival of juvenile salmon returning downriver to the sea and Ecology's duty to maximize the survival of *all* indigenous aquatic life, both fish and non-fish species, by protecting them from the harmful effects of TDG. We affirm.

FACTS

I. Background

The State of Washington Department of Ecology is charged with proposing state water quality standards to the federal Environmental Protection Agency (EPA); these proposed water quality standards include exceptions for Total Dissolved Gas (TDG) on the Columbia and Snake

¹ TDG is the measure of the sum total of all gas partial pressures in water, including water vapor. When air is trapped in water spilling over a dam, the air is plunged far under the water's surface, where the water pressure dissolves the air into the water, creating TDG.

² In an effort to improve salmon survival, Northwest Sportfishing seeks to increase the percentage of TDG allowed in the forebays of Columbia and Snake Rivers from 115 percent to 120 percent or, in the alternative, to remove forebay TDG standards on those rivers altogether.

³ Although the superior court affirmed Ecology's decision on appeal, we review the agency's action, not the superior court's ruling.

⁴ Because we affirm Ecology's decision, we need not address intervener Northwest Riverpartners' contentions that Ecology did not have a legal duty to remove or to modify the 115 percent TDG forebay standards in order to benefit or protect salmon.

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Rivers. *See* 33 U.S.C. § 1313(c)(1); 40 C.F.R. §§131.20(a). When TDG is high, water becomes

supersaturated with gas and gas bubbles can form in the blood and tissues of aquatic organisms. Exposure to elevated amounts of TDG can cause fish and other non-fish aquatic organisms to develop physiological problems, referred to as “gas bubble disease” or “gas bubble trauma,” which can cause rapid acute mortality and increases in long-term mortality in aquatic organisms. Clerk’s Papers (CP) at 170.

A major cause of TDG is the spilling of water over the dams and spillways on the Columbia River and the Snake River systems. Human-controlled “[v]oluntary spill,”⁵ at issue here, is designed to enhance downstream fish passage.⁶ Administrative Record (AR) at 1917.13. Although increased water spill elevates TDG levels, which can harm aquatic life, increased spill also aids downstream fish passage over the dams along the Columbia and Snake Rivers out to the sea. Juvenile salmon passing a dam through spill, for example, have higher rates of survival than fish/juvenile salmon passing a dam through its turbines.⁷

According to the United States Army Corps of Engineers, studies can overstate salmon spill survival rates by failing to consider negative impacts from spill on overall salmon migration. Although spill can improve survival rates of juvenile salmon swimming downstream to the sea, spill can also impact overall survival rates of salmon generally by negatively impacting adult

⁵ In contrast, “[i]nvoluntary spill” is water flowing over the dam when the water exceeds the dam’s hydraulic capacity; involuntary spill usually results from high river flows, lack of power demand, or maintenance reasons. AR at 1917.13.

⁶ Voluntary spill is at issue in the present case. Therefore, references to “spill” in this opinion generally refer to voluntary spill.

⁷ Estimates for turbine survival range from 86.5 percent to 93.4 percent; some estimates for spillway survival rates range from 98 percent to 100 percent.

salmon returning from the sea to spawning grounds or hatcheries up river. Given existing tools and data, understanding the direct and indirect effects of increased spill on fish survival is “impossible to adequately determine.” AR at 32.12.

In 1997, in an effort to balance the negative effects of elevated TDG with the corresponding increased down-stream fish-passage benefits of spill, Ecology created an exception to the statewide standard that limits TDG to 110 percent. *See* former WAC 173-201A-060(4) (1997). This exception applies to TDG levels in forebays immediately behind and tailraces immediately below the Columbia and Snake River dams, allowing 115 percent TDG in the upstream forebay of the next dam down river and 120 percent TDG in the downstream tailrace immediately below each dam. Former WAC 173-201A-060(4) required Ecology to revisit the TDG standards in 2003.

In 2003 and in 2006, Ecology submitted to the EPA’s proposed TDG water quality standards, including TDG exceptions for the Columbia and Snake Rivers. Deeming these exceptions “protective of the designated uses and consistent with the [Clean Water Act⁸] and its implementing regulations at 40 C.F.R. 131,” the EPA approved Ecology’s proposed 115 percent forebay and 120 percent tailrace TDG exceptions for these two rivers. AR at A.2610. Ecology codified these approved exceptions in WAC 173-201A-200(1)(f)(ii).

II. Petitions for Rulemaking

Soon thereafter Northwest Sportfishing petitioned Ecology, asking it to engage in rulemaking to reconsider TDG standards for the Columbia and Snake Rivers; between 2007 and

⁸ 33 U.S.C.A. § 1251 et seq.

2010, Northwest Sportfishing filed three such petitions. Northwest Sportfishing's first petition resulted in the Adaptive Management Team (AMT) report,⁹ a key report at issue here. Ecology denied Northwest Sportfishing's second and third petitions. Ecology's denial of this third petition is the subject of this appeal.

A. First Petition; Adaptive Management Team Report

In March 2007, Save Our Wild Salmon, which included Northwest Sportfishing and other appellants here, petitioned Ecology to amend WAC 173-201A-200(1)(f)(ii) to remove the 115 percent TDG standards on the Columbia and Snake Rivers. But Save Our Wild Salmon withdrew this first petition and entered into direct discussions with Ecology to modify or to eliminate TDG standards on the Columbia and Snake Rivers. As a result, Ecology and Oregon's Department of Environmental Quality convened the AMT, which comprised eleven member organizations: the Columbia River Inter Tribal Fish Commission, the Confederated Tribes of the Colville Reservation, Ecology, the EPA, the Grant County Public Utility District, the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries), Northwest Riverpartners, Oregon's Department of Environment Quality, Save Our Wild Salmon, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. The AMT met monthly from November 2007 through September 2008 to discuss elevating the 115 percent TDG forebay standard.

In January 2009, the AMT published its findings related to TDG standards in the forebays of the Columbia and Snake Rivers. The AMT's report evaluated the technical information that it

⁹ Wash. State Dep't of Ecology & State of Or. Dep't of Env'tl. Quality, Adaptive Management Team Total Dissolved Gas in the Columbia and Snake Rivers: Evaluation of the 115 Percent Total Dissolved Gas Forebay Requirement (Jan. 2009) (Publication No. 09-10-002).

considered, including (1) three separate literature reviews on the impact of TDG on aquatic life, conducted by Ecology, NOAA Fisheries, and Parametrix; (2) the amount of increased spill that would result from removing the 115 percent TDG standard; and (3) the impact of this increased spill on fish passage. Although Ecology and Oregon's Department of Environmental Quality reached different conclusions, both agencies agreed with the AMT report's technical findings.¹⁰

1. TDG impact on aquatic life

Ecology's literature review concluded that increasing TDG above 115 percent would have a detrimental effect on aquatic life near the water's surface, but that below one meter from the surface, aquatic life would not be impacted if TDG standards increased to 120 percent. To support this conclusion, Ecology summarized thirty articles and studies in the AMT report addressing the impact of TDG on various aquatic organisms. In describing the impact of TDG on aquatic life one meter from the water's surface, Ecology acknowledged, "While some studies did not find any effects at 120 [percent] TDG, the weight of all the evidence clearly points to detrimental effects on aquatic life near the surface when TDG approaches 120 [percent]," ranging from behavior changes to high levels of mortality after a few days. AR at 1917.48. Finally, Ecology noted studies showing that, because of "depth compensation,"¹¹ high mortalities in various species are not common when TDG reaches 120 percent in the Columbia and Snake

¹⁰ Oregon decided to remove the 115 percent TDG forebay standard, and Ecology decided not to modify the standard.

¹¹ "[D]epth compensation" refers to the 10 percent reduction in TDG that occurs every meter below the surface water. AR at 1917.64. For example, a TDG level of 120 percent at the surface would mean all aquatic life below one meter would experience a depth-compensated TDG equivalent to 110 percent.

Rivers but that a significant TDG margin of safety is necessary because high mortality is such an “undesirable outcome.” AR at 1917.48.

In addition to reviewing articles addressing TDG impact on various species, Ecology separately reviewed fifteen other studies bearing on depth distribution of fish in the Columbia and Snake Rivers.¹² Based on its depth-distribution literature review, Ecology concluded that (1) the mean depth of fish is always deeper than one meter and usually deeper than two meters, and (2) the amount of time that fish spend at depths less than one meter is usually less than the amount of time where significant TDG effects occur. Ecology also noted in the AMT’s report that fish can be negatively affected by TDG without showing evidence of gas bubbles and that salmon usually migrate closer to shore, where TDG levels are usually lower.

The NOAA Fisheries’ literature review concluded that (1) there were “negligible¹³ adverse effects from 120 [percent] TDG on resident fish and aquatic invertebrates”; and (2) at 120 percent TDG, with depth compensation, all aquatic life one meter below the water’s surface would have depth-compensated TDG exposure equivalent to 110 percent TDG. AR at 1917.52. Nevertheless, NOAA Fisheries cautioned that to conclude that removal of the 115 percent TDG forebay standard would be appropriate, two assumptions must be made: (1) that negligible adverse effects are acceptable, or at least the effects are mitigated by the benefits of lowering the

¹² Ecology noted that depth distribution and shallow water exposure of aquatic organisms are not well-known. Specifically, there is little information about free-floating and surface dwelling organisms like fish larvae, crustaceans, and mollusks.

¹³ The AMT report defines “negligible” as “so unimportant as to be safely disregarded.” AR at 1917.10.

TDG standards; and (2) that the Columbia and Snake Rivers provide organisms adequate depth protection from TDG through the availability of deep water, even though not all aquatic life lives in that deep water.

Parametrix also conducted a literature review, finding that (1) 120 percent TDG produces “little or no” gas bubble trauma to aquatic life at a compensating depth of two or more meters, (2) field studies have not found “population effects” resulting from TDG, (3) biological effects from TDG are influenced by a species’ depth distribution resulting from that species’ natural behavior, and (4) there is little evidence suggesting that species actively avoid high TDG levels. AR at 1917.53. Similar to the NOAA Fisheries review, the Parametrix literature review also cautioned that, in order to conclude that removal of the 115 percent TDG forebay standard would be acceptable, the same two assumptions would also have to be accepted: namely, that negligible adverse effects from TDG are acceptable (or mitigated by the benefits of lowering the TDG standards) and that the Columbia and Snake Rivers provide organisms adequate depth protection from TDG. Apparently, however, these necessary assumptions could *not* be accepted because, as the AMT concludes, “[T]here is no way to know the exact impacts on aquatic life from increases in TDG due to the increase in spill.”¹⁴ AR at 1917.10.

2. Increased spill resulting from removal of TDG standards

The AMT also reported three separate studies’ different results concerning the total amount of additional spill that would occur if Ecology eliminated the 115 percent TDG forebay

¹⁴ Both Ecology and the Oregon Department of Environmental Quality reached this conclusion based on studies and team members’ input.

standard, which restrained spill amounts. The studies predicted a yearly increase in spill from 1 to 60 percent¹⁵ for all Columbia and Snake River dams, depending on the year and scenario; from 1.8 to 4 percent, depending on the year; and from 1.3 percent averaged over 70 years. Based on studies and input from AMT members, Ecology and the Oregon Department of Environmental Quality concluded that, if the agencies remove the 115 percent TDG forebay standard, the total amount of additional water spilled would be between 1 and 2 percent.

3. Increased fish passage and survival rates

Using the three spill studies predicting the amount of increased spill that would occur if Ecology eliminated the 115 percent TDG standard, the AMT looked at potential impacts such increased spill would have on fish passage and fish survival in the Columbia and Snake Rivers. Four entities used the three spill studies to make fish passage and survival predictions. First, the Fish Passage Center study “showed a [positive] relationship between increased spill and increased reach survival for juvenile [yearling spring/summer Chinook, steelhead and fall Chinook] migrants.” AR at 1917.34. Second, the U.S. Fish and Wildlife Service analysis used the three

¹⁵ The AMT report characterized this 60 percent increase in spill as a “theoretical maximum,” which appears much larger than other predicted spill increases in the same study and predicted spill increases in other studies. AR at 1917.09. This 60 percent increase in spill resulted from the following set of assumptions: 120 percent TDG standard in the forebay and spill not limited by planned dam operations. Planned dam operations, however, are standards mandated in the “Biological Opinion” (designed to “help reverse the downward trend in listed salmon populations and therefore, ensure viable salmon resources in the Columbia River Basin”) that the Endangered Species Act, 16 U.S.C.A. §§ 1531 to 1543, requires the Federal Columbia River Power System to produce. AR at 1917.15. According to a different study, however, the Biological Opinion is a much greater factor in limiting spill than the TDG forebay standards; the Biological Opinion limits spill 76 percent of the time on the Columbia and Snake Rivers compared to the 115 percent TDG standard in the rivers’ forebays limiting spill just 12 percent of the time.

scenarios from the Fish Passage Center spill study (as distinguished from its fish survival and passage study)¹⁶ to predict the average absolute percentage increase in survival of various juvenile species, which ranged from 0 to 9¹⁷ percent depending on the species, dam location, and spill scenario. Third, using a spill study based on 70 years of historical data, NOAA Fisheries estimated the absolute increase in passage and survival rates of various juvenile salmonids¹⁸ if Ecology eliminated the 115 percent TDG forebay standard; these results were mixed, with survival rates from just above 0 to 0.1 percent depending on the type of fish and the river location. Fourth, Columbia River Inter Tribal Fish Commission reviewed different dam passage routes for salmon; it concluded that a combination of spill and surface bypass structures¹⁹ provide the safest downstream passage routes for adult salmon to improve fish passage efficiency throughout the dam system.

¹⁶ The Fish Passage Center study predicted spill volumes depending on three separate scenarios. In scenario B, the study predicted the spill that would have occurred if all projects spilled up to the 120 percent TDG limit *on days when the 115 percent TDG forebay standard limited spill*. In scenario C, the study predicted spill that would have occurred if all projects spilled up to the 120 percent TDG limit, while still staying within planned operations. Finally, scenario D predicted spill that would have occurred if all projects spilled up to the 120 percent TDG limit, without planned operation limitations. Scenario D represented the “theoretical maximum” amount of spill. AR at 1917.09.

¹⁷ Predicted survival increases generally ranged between 0 and 3 percent, with Scenario D, the “theoretical maximum” amount of spill, producing predicted survival rates as high as 9 percent. AR at 1917.09.

¹⁸ “Salmonid” is defined as “a fish of the family Salmonidae,” meaning the salmon family. Webster’s Third New International Dictionary 2004 (2002).

¹⁹ The Columbia River Inter Tribal Fish Commission identified “surface bypass structures” as an “emerging, promising adult downstream passage route” that reduces adult salmon passage delays. AR at 1917.41.

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Synthesizing these four fish passage and survival analyses, the AMT report concluded,

“It is difficult to assess the precise impacts on fish passage and survival that would result from removing the 115 [percent] TDG limit forebay requirement.” AR at 1917.41. The report reached this conclusion because the various survival rate studies relied on different underlying empirical and simulated data that contained differing assumptions, and each of the four studies “has a high level of uncertainty and controversy.” AR at 1917.10. Thus, based on studies and input from AMT members, Ecology and the Oregon Department of Environmental Quality concluded the exact impacts on fish survival that would result from removing the 115 percent TDG forebay standard are unknown.

4. Ecology and the Oregon Department of Environmental Quality TDG decisions

Although a “close call,” based on information from the AMT report, Ecology decided not to change the 115 percent TDG forebay standards. AR at 1364.1. Ecology determined that the 115 percent TDG forebay standard provides an additional margin of safety for “chronic protection” against gas bubble trauma in *all* aquatic life because most aquatic life spends more time in the forebay than in the tailrace of a dam. AR at 1917.62. Ecology also noted that “there would be a potential for a small benefit to salmon related to fish spill if the 115 [percent] forebay criterion was eliminated, but there would also be the potential for a small increase in harm from increased gas bubble trauma.” AR at 1917.62. Ecology did not believe the “overall benefits of additional spill [to salmon] versus additional risk of gas bubble trauma [to other aquatic life] are

clear and are sufficient for a rule revision.”²⁰ AR at 1917.63.

The EPA ultimately approved Ecology’s TDG standards limiting TDG levels on the Columbia and Snake Rivers to 115 percent in the forebays and 120 percent in the tailraces of dams (measured as an average of the twelve highest consecutive hourly readings in any one day), and 125 percent average within any single hour. The EPA labeled the requirements as “protective of the designated uses and consistent with the [Clean Water Act], and its implementing regulations at 40 C.F.R. 131.” AR at A.2610.

B. Second Petition

In 2009, Save Our Wild Salmon, which included Northwest Sportfishing and the other appellants, again petitioned for rulemaking to change the 115 percent TDG forebay standards. In August 2009, Ecology again denied the petition, relying on its earlier conclusions from the AMT report that it had released in January 2009.²¹

C. Third Petition

In March 2010, Save Our Wild Salmon, which again included Northwest Sportfishing and the other appellants, petitioned Ecology for rulemaking a third time to modify the 115 percent

²⁰ Ecology also noted that changing the TDG standard in Washington is more difficult than creating a TDG waiver in Oregon. In fact, Oregon’s Department of Environmental Quality reached a different conclusion: Based on the same information, Oregon’s Department of Environmental Quality determined that removal of the 115 percent TDG forebay standard would not cause “excessive harm to the beneficial use, aquatic species in the Columbia River.” AR at 1917.63. Acknowledging Ecology’s literature review, Oregon’s Department of Environmental Quality noted the potential negative impacts on aquatic life residing within one meter of the surface; but it determined that Oregon’s 105 percent TDG standard in shallow water adequately protects aquatic life.

²¹ Ecology also included an attachment responding to Save Our Wild Salmon’s concerns.

TDG forebay standard. Save Our Wild Salmon asserted that (1) spill is vital to salmon and steelhead protection; (2) the 115 percent TDG forebay standard is not grounded in science because Ecology failed to consider all relevant studies appropriately in that it omitted key studies on the benefits of increased spill to other species (such as the Pacific lamprey²²), misrepresented other studies, and did not rely on field studies; (3) forebay TDG monitors do not provide credible data for monitoring river compliance with TDG standards; (4) the 115 percent TDG forebay standard does not protect the most sensitive designated use of the Columbia and Snake Rivers—salmonid habitat; and (5) the current TDG standards violate state and federal law.

Save Our Wild Salmon's petition identified six "key" studies that it claims Ecology failed to consider in its literature review and in the AMT report: (1) Ryan, et al (2000); (2) Schrank, et al (1997); (3) Cochnauer (2000); (4) Toner, et al. (1995); (5) Nebeker, et al. (1981); and (6) Schneider (2000).²³

²² Yet, Save Our Wild Salmon acknowledged it could not produce any study showing that Pacific lamprey would benefit from increased spill. Instead, Save Our Wild Salmon speculates, based on the paucity of information indicating precise juvenile lamprey survival benefits from increasing spill by eliminating the 115 percent forebay standard, "[I]t is highly likely that juvenile lamprey will benefit indirectly from increased spill." AR at 1753.13.

²³ Brad A. Ryan, Earl M. Dawley & Richard A. Nelson, *Modeling the Effects of Supersaturated Dissolved Gas on Resident Aquatic Biota in the Main-Stem Snake and Columbia Rivers*, 20 N. Am. J. Fisheries Mgmt. 192 (2000) (see AR at 2093.1-.10); Boyd P. Schrank, Earl M. Dawley & Brad Ryan, *Evaluation of the Effects of Dissolved Gas Supersaturation on Fish and Invertebrates in Priest Rapids Reservoir, and Downstream from Bonneville and Ice Harbor Dams*, 1995 (July 1997) (on file with the Coastal Zone and Estuarine Studies Division, Northwest Fisheries Science Center, Seattle, Wash.) (see AR at 2197.1-.50); Tim Cochnauer, *Summarization of Gas Bubble Trauma Monitoring in the Clearwater River, Idaho: 1995-1999 Final Report* (Dec. 2000) (Project No. 199701700; BPA Report DOE/BP-31259-3) (see CP at 44-45); Margaret A. Toner, Brad Ryan & Earl M. Dawley, *Evaluation of the Effects of Dissolved Gas Supersaturation on Fish and Invertebrates Downstream from Bonneville, Ice Harbor, and Priest Rapids Dams*, 1994 (Nov. 1995) (on file with the Coastal Zone and Estuarine Studies Division, Northwest Fisheries Science

²⁴ See CP at 43-45. Save Our Wild Salmon argued that a 2000 National Marine Fisheries Service study by Ryan, et al, supported its conclusion that fish and invertebrates would not be harmed by removing the 115 percent TDG forebay standard.²⁵ Save Our Wild Salmon also specifically

Center, Seattle, Wash.) (see AR at 2101.1-.41); A.V. Nebeker, F.D. Baker & S.L. Weitz, *Survival and Adult Emergence of Aquatic Insects in Air-Supersaturated Water*, 1 J. Freshwater Ecology 243 (1981) (see AR at 2090.1-.8); Nat'l Marine Fisheries Serv., U.S. Dep't of Commerce, Biological Opinion: Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin App. E (Risk Assessment for Spill Program Described in 2000 Draft Biological Opinion) (Dec. 21, 2000) (see CP at 44-45).

²⁴ Save Our Wild Salmon also argued below that the following studies supported its assertion that fish and invertebrates would not be harmed by removing the 115 percent TDG forebay standard:

- Schrank et al. (1997) monitored invertebrates and resident nonsalmonid fish species held in net-pens downstream from Bonneville Dam and Ice Harbor Dam in 1995. Of the 1,303 invertebrates . . . sampled, only one species showed any signs of [gas bubble trauma] (between 0.5-3.5 percent prevalence, overall frequency of 0.23 percent).
- Cochnauer (2000) examined more than 30,000 resident fish for [gas bubble trauma] over a [five] year period in the Clearwater river, Idaho, with never greater than a [one] percent overall incidence of [gas bubble trauma] in a given year.
- Toner et al. (1995) collected 18,000 specimens of resident fish and invertebrates below Bonneville and Ice Harbor dams and above and below Priest Rapids Dam in 1994. Of the 4,133 invertebrates sampled, only one species showed any signs of [gas bubble disease] and only at a minimal prevalence.
- Nebeker et al. (1981) determined the effects o[f] TDG on survival and adult emergence of mayflies, caddisflies, mosquitoes, and midges in laboratory tests. All of these insects were more tolerant of TDG supersaturation than fish.
- Schneider (2000) provides an assessment by the National Marine Fisheries Service of the 120 percent criterion and concludes that the risk associated with the 120 percent TDG is warranted by the projected 4-6 percent increase in salmon survival from increased spill.

CP at 44-45 (footnotes omitted). Northwest Sportfishing, however, does not make arguments based on the Cochnauer and Schneider studies to us in its briefing of appellant.

²⁵ According to Northwest Sportfishing, this 2000 Ryan study showed that aquatic life within a meter of the surface would not be harmed by removing the 115 percent TDG forebay standard because (1) only 3.9 percent of non-salmonid fish displayed signs of gas bubble trauma during a four-year study over a variety of TDG levels, including one year when the TDG ranged from 120

asserted in its petition that Ecology misrepresented three other studies in the AMT report.²⁶

Ecology denied the petition, predicated its denial on the AMT report from 2009.

Ecology also attached to its denial letter a more detailed response to the five issues raised in Save Our Wild Salmon's petition, three of which are relevant to the present appeal. Ecology agreed with Save Our Wild Salmon that spill is an important measure to decrease mortality of migrating salmon and steelhead. But Ecology also explained that on the Columbia and Snake Rivers it already allows an exception above the state-wide 110 percent TDG standards and that its 115 percent TDG forebay standard balances benefit to salmon with another designated use of the Columbia and Snake Rivers, namely, protection of indigenous fish and non-fish aquatic species, especially aquatic organisms residing in the upper portion of the water column that cannot utilize

to 130 percent; and (2) only 7 out of 5,434 examined invertebrates showed signs of gas bubble trauma over a two-year inspection of invertebrates at unspecified levels of TDG.

²⁶ Save Our Wild Salmon claimed that Ecology's literature review misrepresented a 2003 Parametrix study by (1) stating that 9 percent of mayflies in the study showed signs of gas bubble trauma although the review failed to mention that the study found a single mayfly with gas bubble trauma; and (2) failing to disclose that the study examined 9,855 invertebrates, finding only two invertebrates with signs of gas bubble trauma (0.02 percent of the total sample). Save Our Wild Salmon also claimed that Ecology misrepresented a study by Weitkamp et al. (2003a) in its literature review in that Ecology failed to note the study's authors' conclusion that intermittent exposure to 125 and 130 percent TDG levels would have "essentially no effect" on resident fish and that TDG levels below 125 percent do not result in substantial incidences of gas bubble trauma for resident fish. CP at 45.

And Save Our Wild Salmon asserted that Ecology failed to note in its review of a study by Richter et al. (2006) that the study sampled 3,012 fish specimens and confirmed that, when TDG is 120 percent or less, symptoms of gas bubble trauma are "minimal to nonexistent." CP at 46. Contrary to Save Our Wild Salmon's assertion, Ecology's literature review noted that this 2006 Richter study did not find gas bubbles in resident fish at a TDG level of 120 percent and that the depth at which biologists collected the studied fish was unknown. But Northwest Sportfishing neither reiterates this contention nor provides a record cite for this Richter study in its brief of appellant; thus, we do not consider on appeal whether Ecology misrepresented this study. See RAP 10.3(a)(5).

depth compensation to avoid negative TDG effects.

Ecology disagreed with the petition's contention that the 115 percent TDG forebay standard was not grounded in science. On the contrary, Ecology noted that it had read all of the studies that Save Our Wild Salmon claimed Ecology had failed to consider and it had reviewed all the referenced studies in its literature review for the AMT report. Although Ecology acknowledged that some of its literature review summaries could have more clearly included information contained in Save Our Wild Salmon's petition, Ecology maintained that it had not misrepresented those studies. Instead, Ecology explained that some of those studies were not intended to analyze the effect on aquatic organisms below 120 percent TDG levels and, therefore, Ecology "did not necessarily consider [those parts of the studies] in the 'weight of [the] evidence.'" CP at 32. Ecology further pointed out that (1) other studies identified in its AMT report literature review showed lethal and sublethal effects to some aquatic organisms, which cannot be deemed negligible; and (2) even if those other studies were experimental in nature, in contrast with field studies, the EPA and many states routinely use experimental studies to develop water quality standards.

Finally, Ecology asserted that this standard is maintained to protect designated aquatic life uses. Ecology agreed with Save Our Salmon that salmon generally spend time at depths below one meter and usually below two meters and, thus, as a result of depth compensation, would not be negatively affected by elevated TDG. Again, however, Ecology explained it could not disregard negative TDG effects on other aquatic organisms that cannot detect or avoid

elevated TDG within a meter of the water surface.²⁷

III. Appeal

Northwest Sportfishing and others from Save Our Wild Salmon appealed Ecology's rule-making petition denial to Thurston County Superior Court, asking it to order Ecology to promulgate a new rule for TDG standards on the Snake and Columbia Rivers.²⁸ Northwest Riverpartners²⁹ intervened. Northwest Sportfishing and the other appellants argued that Ecology's denial of the third rulemaking petition was "arbitrary and capricious, contrary to Washington law, and exceed[ed] the statutory authority of the agency, in violation of RCW 34.05.570(4)(c)," because Ecology had failed to consider or adequately to address credible scientific information. CP at 23. Determining that Ecology's denial of rulemaking was not arbitrary and capricious, the superior court affirmed Ecology's denial of the rule making petition.

²⁷ In its opening brief of appellant, Northwest Sportfishing characterizes Ecology as "rel[ying] exclusively on only four specific laboratory studies to support its assertion that evidence shows detrimental effects to some aquatic organisms from TDG levels between 115 [percent] and 120 [percent]." Br. of Appellant at 33. This characterization is misleading. Although Ecology cited four studies supporting that increasing TDG levels to 120 percent would harm various specific species, it had also explained in its denial letter that (1) its literature review presented evidence that "shows the potential for a small increase in harm to aquatic life"; and (2) it had denied Save Our Wild Salmon's petition based on the results of its AMT report. CP at 29. Thus, contrary to Northwest Sportfishing's assertion, Ecology did not rely exclusively on four studies in denying the petition because it had also incorporated its previous literature review and AMT report into the denial.

²⁸ Northwest Sportfishing initially asserted three causes of action under the judicial review provisions of Washington's Administrative Procedure Act, RCW 34.05.570. But Northwest Sportfishing later dropped two causes of action.

²⁹ Northwest Riverpartners "includes a group of electric customers, ports, business owners and farmers." CP at 161.

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Northwest Sportfishing appeals.

ANALYSIS

Northwest Sportfishing argues that (1) Ecology has a legal duty to set water quality standards at levels that protect the most sensitive designated uses of the State's waterways, which include salmon migration, especially down-stream-migrating young salmon, spawning, and rearing, in addition to protecting all indigenous fish and non-fish aquatic species; (2) Ecology breached this duty when it erroneously concluded that aquatic life is harmed at 120 percent TDG levels after downplaying relevant evidence that aquatic life is unharmed at 120 percent TDG levels and favoring non-representative laboratory studies over field studies; and (3) Ecology acted arbitrarily and capriciously in denying Northwest Sportfishing's petition to engage in rulemaking to reconsider standard TDG levels.

Ecology responds that its decision to deny the Save Our Wild Salmon's petition for rulemaking (1) was not arbitrary and capricious, but rather the product of a thorough analysis of all available information, complying with its duty to protect designated uses, including all indigenous fish and non-fish aquatic species of the Columbia and Snake Rivers; (2) complied with the requirements of the statute governing an agency's denial of rulemaking, RCW 34.05.330; and (3) was based on credible scientific information and literature. We hold that Northwest Sportfishing fails to overcome its burden to show that Ecology's denial of the rulemaking petition was arbitrary and capricious.

I. Standard of Review

Anyone may petition an agency to request that it adopt, amend, or repeal a rule. RCW 34.05.330(1). An agency's decision to deny such a petition for rulemaking is eligible for judicial

review and relief under RCW 34.05.570(4)(c) if the court determines the agency's action is arbitrary or capricious. In determining whether Ecology's action was arbitrary and capricious, our review is de novo, limited to the agency record available to the court. RCW 34.05.558. Thus, we review Ecology's actions by sitting in the same position as the superior court and by applying Washington's Administrative Procedure Act directly to the record that was before Ecology.³⁰ *Washington Indep. Tel. Ass'n v. Washington Utilities & Transp. Comm'n*, 149 Wn.2d 17, 24, 65 P.3d 319 (2003).

The party seeking judicial review to challenge an agency's action, here, Northwest Sportfishing, bears the burden of demonstrating the invalidity of the agency action, here, that Ecology acted arbitrarily and capriciously in denying the petition for rulemaking. RCW 34.05.570(1)(a). Arbitrary or capricious agency action is action that is willful, unreasoned, and taken without regard to the attending facts or circumstances. *Port of Seattle v. Pollution Control Hearings Bd.*, 151 Wn.2d 568, 589, 90 P.3d 659 (2004).

Neither the existence of contradictory evidence, nor the possibility of deriving a separate conclusion from the available evidence, renders an agency's action arbitrary and capricious. *Rios v. Washington Dept. of Labor and Industries*, 145 Wn.2d 483, 504, 39 P.3d 961 (2002). Similarly, "[w]here there is room for two opinions, and the agency acted honestly and upon due consideration, [we] should not find that an action was arbitrary and capricious, even though this court may have reached the opposite conclusion." *Port of Seattle*, 151 Wn.2d at 589. Instead,

³⁰ Because we review Ecology's actions de novo, we decline Ecology's and Northwest Riverpartners' request to treat the superior court's legal conclusions and factual findings as verities on appeal.

we review the agency's decision to determine whether the agency reached its decision ““through a process of reason, *not whether the result was itself reasonable in the judgment of the court.*”” *Rios*, 145 Wn.2d at 501 (quoting *Aviation W. Corp. v. Washington Dept. of Labor and Industries*, 138 Wn.2d 413, 432, 980 P.2d 701 (1999)).

We also avoid exercising discretion that our legislature has placed in the agency. *Port of Seattle*, 151 Wn.2d at 589. An agency is accorded “wide discretion” when deciding to forgo rulemaking. *Rios*, 145 Wn.2d at 507. Moreover, it is well settled that we must give “due deference . . . to the specialized knowledge and expertise of an administrative agency.” *Dep't of Ecology v. PUD No. 1 of Jefferson County*, 121 Wn.2d 179, 201, 849 P.2d 646 (1993), *aff'd*, 511 U.S. 700, 114 S. Ct. 1900, 128 L. Ed. 2d (1994). Thus, we must determine whether Ecology reached its decision through a reasoned process, not whether the result itself is reasonable in our judgment or whether we would reach the same decision given the same evidence. *Rios*, 145 Wn.2d at 501.

II. Petition Denial Not Arbitrary and Capricious

At the outset, we agree with Northwest Sportfishing that Ecology has a duty to set water quality standards at levels that protect the most sensitive designated uses of the State's waterways, including salmon migration, spawning, and rearing, and protect other aquatic life as well, including indigenous fish and non-fish aquatic species. WAC 173-201A-200(1). It is in this broader context that we address Northwest Sportfishing's arguments that Ecology breached this duty and acted arbitrarily and capriciously when Ecology denied Northwest Sportfishing's petition for rulemaking to revise TDG standards to be more favorable to downstream migrating juvenile

salmon.

Northwest Sportfishing contends that Ecology acted arbitrarily and capriciously (1) in deciding to retain the 115 percent TDG forebay standard, despite Ecology's recognition that eliminating this standard could potentially provide only "a small benefit" to salmon; (2) determining that the weight of all the evidence from available scientific studies clearly points to detrimental effects on aquatic life near the surface when TDG approaches 120 percent; and (3) basing its decision "entirely" on the validity of Ecology's findings that other aquatic life would be harmed at 120 percent TDG levels.³¹ Br. of Appellant at 23, 24. Ecology responds that it relied on credible data to reach its decision and that it met statutory requirements for agency review of a rulemaking petition under RCW 34.05.330(1); therefore, Northwest Sportfishing fails to meet its burden to establish that Ecology's petition denial was arbitrary and capricious.³² The record supports Ecology's assertion.

A. Ecology neither Failed To Consider nor Misinterpreted Relevant Studies

Ecology's petition denial was predicated primarily on harmful effects on aquatic species

³¹ More specifically, Northwest Sportfishing contends that Ecology acted arbitrarily and capriciously when it erroneously found that other, non-salmonid, aquatic life would be harmed if it removed the 115 percent forebay TDG standards because (1) Ecology failed to consider relevant evidence that demonstrates aquatic life is not harmed by 120 percent TDG levels; and (2) Ecology irrationally relied on non-representative laboratory experiments, rather than on representative field studies, which support the conclusion that aquatic life is not harmed by 120 percent TDG levels.

³² Intervener Northwest Riverpartners similarly responds that Ecology acted reasonably because (1) Ecology had no legal duty to promulgate the requested rule; (2) even if it did have such a legal duty, Ecology's decision to maintain current TDG standards was the result of a reasoned decision-making process in that it carefully considered all the evidence that Northwest Sportfishing alleges it failed to consider or understand correctly; and (3) we should not "second-guess" Ecology's expert scientific determination. Br. of Resp't (Northwest Riverpartners) at 21.

unable to depth compensate (in contrast with fish such as salmon, which can depth compensate). Northwest Sportfishing, however, contends that Ecology's denial of its petition for rulemaking failed to discuss or, alternatively, "downplayed" the significance of the studies from Save Our Wild Salmon's petition showing that resident fish and invertebrates are not harmed by TDG levels up to 120 percent. Br. of Appellant at 26. Ecology counters that (1) it responded to all the concerns raised in Save Our Wild Salmon's petition for rulemaking; (2) it "reviewed all of those studies [from Save Our Wild Salmon's petition] and further noted that those studies were also contained in Ecology's literature review" for the AMT report; (3) its denial of the petition was grounded in facts from the record, based on its technical expertise; and (4) Northwest Sportfishing's disagreement with the ultimate outcome "does not convert Ecology's denial into arbitrary or capricious action." Br. of Resp't (Ecology) at 25.

In both its petition for rulemaking and on appeal, Northwest Sportfishing contends that Ecology failed to consider the following four studies: Ryan (2000), Schrank (1997), Toner (1995), and Nebeker (1981). Northwest Sportfishing also alleges in its rulemaking petition and on appeal that Ecology misrepresented two other studies: Weitkamp (2002) and Parametrix (2003).³³ We address each study in turn.

1. Ryan study (2000)

³³ Don E. Weitkamp, Robert D. Sullivan, Tim Swant & Joe DosSantos, *Gas Bubble Disease in Resident Fish of the Lower Clark Fork River*, 132 Transactions Am. Fisheries Soc'y 865 (2003) (see AR at 2103.1-.19); Parametrix & RL&L Envtl. Servs., Total Dissolved Gas Biological Effects, 2002 (Feb. 14, 2003) (unpublished report on the Rocky Reach Hydroelectric Project, FERC Project No. 2145, prepared for Public Utility District No. 1 of Chelan County, Wenatchee, Wash.) (see AR at 2091.1-.87).

In its third petition and in its appellate brief, Northwest Sportfishing relies on gas bubble trauma statistics from the 2000 Ryan study and asserts that Ecology failed to consider or to discuss this study in its literature review for the AMT report and in its rulemaking petition denials. Contrary to Northwest Sportfishing's assertion, however, Ecology did include the Ryan (2000) study in its literature review, summarizing the study as correlating the effects of TDG levels and exposure with gas bubble trauma, which was a major focus of the article.³⁴ Furthermore, the Ryan study fails to offer conclusive proof that non-fish aquatic organisms residing in the top meter of the water column would not be harmed by modifying the 115 percent TDG forebay standard. Nor do the statistics in this study render Ecology's petition denial arbitrary and capricious.

2. Schrank study (1997)

In the 1997 Schrank study,³⁵ scientists monitored the prevalence and severity of gas

³⁴ The Ryan study scientists sampled 39,924 resident fish from the Columbia and Snake Rivers; they also collected 5,434 invertebrates within 0.6 meters of the water surface. During this four-year study, 3.9 percent of all fish displayed signs of gas bubble trauma. Seven of the 5,434 (0.1%) invertebrates collected over a two-year period, (1994-1995) also displayed signs of gas bubble trauma. The study is not clear, however, about average daily or weekly TDG levels in 1994; instead, it mentions how often TDG levels exceeded 120 percent at one site that year. Although the study mentions average daily TDG levels for 1995 at the various sites, with levels ranging from around 110 to 135 percent, it does not mention how many invertebrates were caught in 1994 compared to 1995.

The part of the study on which Northwest Sportfishing relies is relevant to Ecology's asserted reason for denying the rulemaking petition, namely protecting aquatic species that cannot depth compensate to avoid TDG effects. But the study is not clear about the ratio of invertebrates caught in 1994 compared to those caught in 1995 and the TDG levels present at those times.

³⁵ The Schrank study discussed resident fish, salmonid species, and invertebrates. Scientists sampled 1,303 invertebrates downstream from Bonneville and Ice Harbor dams, with few showing signs of gas bubble trauma. One of the 804 invertebrates sampled at Bonneville showed signs of gas bubble trauma; two of the 499 invertebrates sampled at Ice Harbor showed signs of gas bubble trauma.

bubble trauma by sampling fish and invertebrates downstream from Bonneville and Ice Harbor dams and upstream from the Priest Rapids dam.³⁶ Contrary to Northwest Sportfishing's assertion that "[n]either Ecology's petition denial nor its Literature Review discuss this study at all,"³⁷ Ecology's literature review contained two entries for this Schrank study.³⁸ Although Northwest Sportfishing is correct that invertebrates sampled for the Schrank study exhibited few signs of gas bubble trauma, again, definite conclusions are difficult to draw from this study.³⁹

3. Nebeker study (1981)

Again contrary to Northwest Sportfishing's contention, the record shows that Ecology considered the 1981 Nebeker study in its literature review and that it set forth this study's results. The Nebeker study scientists tested the effects of TDG on four aquatic insect species in

The report provided average daily TDG levels when scientists sampled fish at Bonneville and Ice Harbor during a similar time period. Average daily TDG for *fish* samples exceeded 115 percent TDG on 10 of 27 days at Bonneville dam and on 10 of 21 days at Ice Harbor. These daily TDG levels, although helpful to understanding general TDG conditions in the Columbia and Snake Rivers, had different start or end dates than the invertebrates' sampling. Similarly, because the report used daily averages, instead of weekly averages, the report was unclear about whether invertebrate sampling occurred on different days than fish sampling and with different TDG levels.

³⁶ Northwest Sportfishing's rulemaking petition inaccurately categorized the Schrank study as finding only one specimen that exhibited signs of gas bubble trauma out of the 1303 invertebrates sampled. Actually, the Schrank study found three invertebrates with signs of gas bubble trauma.

³⁷ Br. of Appellant at 27.

³⁸ Moreover, the first entry also provided a description of the resident fish findings in Schrank, although it did not mention the Schrank study's invertebrate findings.

³⁹ For example, the Schrank study did not include average TDG levels for the days that scientists sampled invertebrates. The study did show, however, that TDG levels exceeded 115 percent on nearly half of the days that scientists sampled fish, which were also presumably indicative of TDG levels present when scientists sampled invertebrates.

laboratory conditions.⁴⁰ In its petition and its appellate brief, Northwest Sportfishing cites this study to assert that “insects were more tolerant of TDG supersaturation than fish.” CP at 44. But it is inappropriate to use the Nebeker study to compare insect and fish TDG tolerance because Nebeker’s citation to Weitkamp and Katz (1980)⁴¹ did not mention the depth of fish tested in that study, which study used tests not comparable to the Nebeker laboratory study’s aquatic insect focus.⁴² Presumably fish tested in the Weitkamp and Katz (1980) article could depth compensate, if tested at sufficient depths, while insects in Nebeker’s study could not. The Nebeker results alone showed some severe effects on aquatic insects, with 50 percent of the mayflies scientists studied dying after 2.7 days in 125 percent TDG. Thus, the Nebeker study does not conclusively advance Northwest Sportfishing’s claim.

⁴⁰ In the 1981 Nebeker study, scientists tested caddisflies at TDG levels ranging from 134.5 percent to 148.6 percent. Caddisflies tested at higher TDG levels appeared more sluggish than the caddisflies tested at lower levels; and survival rates of the caddisflies ranged from between 80 to 90 percent survival to between 20 to 30 percent survival. The study also discussed tests on mayflies under TDG levels ranging from 125 percent to 151.2 percent; at 125 percent TDG, 50 percent of mayflies studied died after 2.7 days. Scientists studied midge and mosquitoes for the study, as well. Midge testing occurred at TDG levels ranging between 117.6 percent to 141.1 percent; scientists tested mosquitoes at TDG levels between 123.5 percent and 143.7 percent. Both species proved very tolerant of all TDG levels and showed no correlation between species mortality and TDG levels. Citing Weitkamp and Katz (1980), the Nebeker study concluded that the insects were generally more tolerant of TDG than most fish species.

⁴¹ Don E. Weitkamp & Max Katz, *A Review of Dissolved Gas Supersaturation Literature*, 109 *Transactions Am. Fisheries Soc'y* 659 (1980) (*See AR at 2127.1-44*).

⁴² The TDG portions of Weitkamp and Katz’s literature review focused primarily on fish tested in shallow depths (although some studies reviewed were conducted at depths greater than one meter), which would provide an accurate direct comparison to the shallow depths used in Nebeker (1981). These shallow depths, however, do not allow the fish to use depth compensation to avoid the harmful effects of TDG, making any comparison unequal between the real world effects of TDG on fish and aquatic insects.

4. Toner study (1995)

The scientists in the 1995 Toner study offered no conclusions related to non-fish aquatic organisms; instead, they presented, in part, findings on the prevalence of TDG in 4,131 invertebrates.⁴³ Northwest Sportfishing asserted in its petition that the Toner study found only one invertebrate with gas bubble trauma of the some 4,133 sampled, suggesting a conclusion that invertebrates are not harmed by TDG standards above 115 percent.⁴⁴ This assertion is misleading in that the Toner scientists tested the invertebrates in conditions analogous to the 115 percent TDG forebay standard; and four invertebrates showed signs of gas bubble trauma.

Moreover, contrary to Northwest Sportfishing's assertion, Ecology did consider the Toner study in its literature review for the AMT report. Thus, the TDG levels at which the Toner study scientists sampled invertebrates do not necessarily support Northwest Sportfishing's assertion that aquatic life are not harmed when TDG exceeds 115 percent.

⁴³ Toner (1995) sampled organisms from two sites, Bonneville and Ice Harbor dams. Of the 4,131 invertebrates studied, only four showed signs of gas bubble trauma. Scientists obtained 3,928 of the specimen from Bonneville dam, with none of the specimen showing signs of gas bubble trauma. They collected 203 specimens from Ice Harbor dam, with four, or 1.5 percent, showing signs of gas bubble trauma. TDG levels at Bonneville dam, where scientists obtained 95 percent of the invertebrate samples, never exceeded 120 percent at the sampling site. During the sixteen weeks scientists conducted tests, average weekly TDG exceeded 115 percent just one time (117 percent TDG). The average weekly TDG also exceeded 115 percent just once (118 percent TDG) out of the eleven weeks scientists took samples at that site.

⁴⁴ Similarly, in its appellate brief, Northwest Sportfishing uses the Toner and other studies' findings on TDG's impact to free-floating and surface dwelling organisms to counter the following quote from the AMT report: "[T]here was 'little information on free-floating and surface dwelling organisms such as larvae of fish, crustaceans, and mollusks.'" Br. of Appellant at 30 (quoting AR at 1840.52). This quote, taken out of context, does not reveal that it referred to a lack of information about depth distribution, not a lack of information about the impact of TDG on these organisms.

5. Weitkamp study (2002)

In denying the rulemaking petitions, Ecology also considered two other studies that Northwest Sportfishing challenged in its petition below and on appeal: the Weitkamp study (2002) and the Parametrix study (2003). In its petition below, Northwest Sportfishing alleged that Ecology misrepresented these studies.

The 2002 Weitkamp scientists studied resident fish within two meters of the surface of the lower Clark Fork River from 1997 to 2000; they did not study non-fish aquatic species. This study noted challenges in quantifying the effects of TDG: Fish with severe gas bubble trauma can recover to show no signs of trauma, while fish that do not show signs of gas bubble trauma can perish due to high levels of TDG.⁴⁵ The study concluded that most fish spend sufficient time at depths that enable the fish to avoid the affects of TDG through depth compensation.⁴⁶ Because

⁴⁵ In 1997, Weitkamp scientists had observed fish at average two-week TDG levels ranging between 133 and 150 percent, finding that 5.6 percent of all specimens showed signs of gas bubble trauma. The TDG levels in 1998 and 1999 provided the most relevant information here: In 1998, average two-week TDG levels ranged from 103 to 117 percent; under these conditions only 0.1 percent of specimens showed signs of gas bubble trauma. In 1999, average two-week TDG levels ranged from 114 to 125 percent; 5.9 percent of specimens collected under these conditions showed signs of gas bubble trauma, notably 14.3 percent of yellow bullhead and 11.4 percent of largescale sucker. In 2000, average two-week TDG levels ranged from 104 to 108 percent, with only 0.1 percent of specimens showing signs of gas bubble trauma. Based on studies of fish between 1997 and 2000, the Weitkamp scientists observed that (1) incidence and severity of gas bubble trauma in nature were substantially lower than what laboratory results would have predicted, and (2) signs of gas bubble trauma began to appear in fish after ten days of continuous exposure to 125 percent TDG.

⁴⁶ Contrary to Northwest Sportfishing's assertion, Ecology did not misrepresent Weitkamp (2002), mistakenly referred to as Weitkamp (2003a). Rather, Ecology's literature review accurately portrayed this study as finding only one fish with gas bubble trauma when TDG was less than 120 percent.

Weitkamp studied only fish that are able to depth compensate, this study does not support Northwest Sportfishing's attack on Ecology's asserted basis for denying the petition, namely that aquatic species residing in the top of the water column are unable to use depth compensation to avoid the harmful effects of 120 percent TDG.

6. Parametrix study (2003)

The Parametrix (2003) scientists studied the effects of TDG on benthic macroinvertebrates⁴⁷ and resident fish at the Rocky Reach Dam on the Columbia River.⁴⁸ This study concluded that the incidence of gas bubble trauma in benthic macroinvertebrates of the Columbia River downstream of Rocky Reach Dam "is very low." AR at 2091.68.

That some of these studies and Northwest Sportfishing's evidence arguably support

⁴⁷ Parametrix's study included, among other organisms, the following benthic macroinvertebrates: water fleas, crayfish, insects, sow bugs, scuds, midges, bristle worms, snails, bivalves, and roundworms.

⁴⁸ In 2001, average TDG levels during the sample period ranged from 105 to 109 percent; they rarely spiked and even then the levels reached only 112 to 115 percent TDG for a few hours. Researchers found just two cases of gas bubble trauma out of the 7,405 invertebrates sampled in 2001. In 2002, despite frequent spill, TDG levels remained below 115 percent for 75 percent of the studied time and below 120 percent for 92 percent of the studied time. Average TDG levels during the collection period were below 115 percent (114.2 percent in the tailrace and 112.3 percent in the forebays). The researchers collected samples from 0.5 meters below the surface (to study gas bubble trauma without depth compensation) and samples from three meters below the surface (with a depth-compensated TDG level of 100 percent at 130 percent TDG). The 2002 study found two instances of macroinvertebrates exhibiting gas bubble trauma out of the 9,885 samples (one bristle worm and one mayfly).

conclusions different from those Ecology drew⁴⁹ does not render Ecology's action arbitrary and capricious. *Rios*, 145 Wn.2d at 504. In *Rios*, for example, the Washington Supreme Court upheld the Department of Labor and Industry's denial of affected agricultural pesticide handlers' request to promulgate a rule implementing blood test monitoring to prevent health impairment of these handlers. That California had such a mandatory monitoring program, apparently based on similar evidence, did not render the Department's denial of the rulemaking petition arbitrary and capricious.⁵⁰ *Rios*, 145 Wn.2d at 503. Instead, our Supreme Court noted:

“Agency action is arbitrary and capricious if it is willful and unreasoning and taken without regard to the attending facts or circumstances.” *Hillis v. Dep't of Ecology*, 131 Wn.2d 373, 383, 932 P.2d 139 (1997). More specifically, “[w]here there is room for two opinions, an action taken after due consideration is not arbitrary and capricious even though a reviewing court may believe it to be erroneous.” *Id.* . . . “[T]he standard is that ‘[t]he court must scrutinize the record to determine if the result was reached through a process of reason, *not whether the result was itself reasonable in the judgment of the court.*’” Further, in scrutinizing the record, we ask whether the decision “was rational at the *time* it was made.” *Aviation W. Corp.*, 138 W[n].2d at 427.”

⁴⁹ In its third rulemaking petition and in its appellate brief, Northwest Sportfishing accurately asserts that (1) Ecology's literature review “does not disclose that of the 9,855 invertebrates that were examined, only [two] showed any signs of [gas bubble trauma] (0.02 [percent] of the total sample)”; and (2) Ecology failed to disclose that 9 percent of mayflies with gas bubble trauma represented a single mayfly showing signs of gas bubble trauma. CP at 45. Taken in isolation, the low incidence of gas bubble trauma and the Parametrix study's conclusion that the incidence of gas bubble trauma on the Columbia River downstream of Rocky Reach Dam “is very low” could arguably undermine Ecology's asserted reason for denying the petition for rulemaking—protecting aquatic life within one meter of the water's surface; but TDG levels were below 115 percent for most of that study. AR at 2091.68. And, as we explain later, no single piece of evidence or study completely supports or undermines Ecology's decision here.

⁵⁰ Ultimately, however, the Supreme Court held the Department of Labor and Industry had based its decision to forego rulemaking on unfounded assertions that engaging in rulemaking would require the agency to commit substantial resources to rulemaking and to reallocate current project priorities, and, therefore, had acted arbitrarily and capriciously. *See Rios*, 145 Wn.2d at 506-08.

Rios, 145 Wn.2d at 501-502 (internal footnotes omitted).

Similarly here, contradictory field studies arguably favoring removal of the 115 percent TDG forebay standard do not render Ecology's decision arbitrary and capricious. The studies Northwest Sportfishing cited in its rulemaking petitions and recites in its brief of appellant are informative (particularly the Ryan, Schrank, and Parametrix studies). But given their varying deficiencies in the context of Ecology's duty to protect all aquatic species in the rivers at issue, these studies do not show that Ecology acted arbitrarily and capriciously in refusing to change these rivers' TDG standards.⁵¹ RCW 34.05.570(1)(a).

Again, we must accord Ecology "wide discretion." *Rios*, 145 Wn.2d at 507. Reviewed in this light, the record shows that Ecology reached its determination—that aquatic life unable to depth compensate would be harmed by modifying the 115 percent TDG forebay standard—through a reasoned process after considering hundreds of studies in its own literature review, along with the results of two other literature reviews and input from other parties. *See Rios*, 145 Wn.2d at 501, 507.

⁵¹ Ecology based its determination that modifying the 115 percent TDG standard could harm aquatic life within the top meter of the water column on the joint AMT report, which listed thirty studies that mostly showed negative impacts from elevated TDG levels. As we have already noted, Ecology considered each of the studies in its literature review for the AMT report. In denying Northwest Sportfishing's petition for rulemaking, Ecology restated that it had reviewed the studies Northwest Sportfishing identified in its petition. In considering these studies on at least two occasions, but failing to accept Northwest Sportfishing's petition for rulemaking, Ecology did not act without regard to the attending facts or circumstances. *Port of Seattle*, 151 Wn.2d 589. Instead, the record shows that Ecology considered these studies in weighing the evidence and determining the potential harmful effects to aquatic species other than downstream-moving juvenile salmon.

C. Field v. Experimental Laboratory Studies

Northwest Sportfishing also argues that Ecology did not rationally explain why it chose to rely on laboratory studies, which are not representative of “real-world” effects, rather than on field studies specific to the Columbia River basin with larger sample sizes. Br. of Appellant at 39. Ecology responds that its use of laboratory studies is consistent with (1) RCW 90.48.580, which guides an agency’s denial of a rulemaking petition; and (2) its own internal policies promulgated under RCW 90.48.585(3), which requires Ecology to develop a policy to explain ““how it uses scientific research and literature for developing and reviewing any water quality standard.”” Br. of Resp’t (Ecology) at 36 (quoting RCW 90.48.585(3)). Again, Northwest Sportfishing fails to meet its burden to show that Ecology’s denial of its rulemaking petition was arbitrary and capricious.

1. Ecology did not rely exclusively on laboratory studies

Northwest Sportfishing contends that Ecology acted arbitrarily and capriciously by considering only one type of study in denying its rulemaking petition. Contrary to Northwest Sportfishing’s assertion, in its petition denial, Ecology relied on the AMT report, which contained both laboratory and field studies, and it also cited four specific laboratory studies in stating, “[S]ome studies show harmful effects to aquatic life,” such as frogs, sturgeon larvae, and juvenile steelhead trout; these four studies support Ecology’s reasoning. CP at 35. Because the record is not clear whether the frogs studied are native species that Ecology has a duty to protect, it is not clear whether two of these four cited studies⁵² bear on harmful effects to species of fish or non-

⁵² A 1983 laboratory study of tadpoles found that tadpoles with elevated TDG showed increased susceptibility to predators. A 1987 laboratory study found that after four days of exposure to

fish aquatic life that justified Ecology's denial of the petition for rulemaking. The other two studies, however, clearly pertained to Ecology's duty and reason for denying the rulemaking petition: (1) In a 1977 laboratory study, 45 percent of "posthatch" steelhead trout fry experienced mortality at 115.7 percent TDG; and (2) a 1998 laboratory study of the effects of TDG on white sturgeon larvae revealed that 118 percent TDG can result in larvae gas bubble trauma. AR at 2088.1.

Furthermore, as we have previously discussed, Ecology also expressly based its petition denial on the AMT report, which included far more than these four laboratory studies: It incorporated the Parametrix, Ecology, and the NOAA Fisheries literature reviews, which each included both field and laboratory studies. The record thus shows that Ecology did not confine its consideration to only laboratory studies. On the contrary, Ecology "show[ed] its work," as Northwest Sportfishing requests, by conducting the two-year AMT review, summarizing articles in its literature review, and responding to each issue raised in the rulemaking petition.⁵³

2. Laboratory studies' validity

Northwest Sportfishing cites portions of the record in an attempt to establish the superior validity of field studies over laboratory studies. The record, however, does not conclusively support this assertion for appellate review purposes. For example, Parametrix advocates using

116.8 percent TDG, gas bubble trauma and hemorrhaging appeared on frogs.

⁵³ Br. of Appellant at 41.

field studies instead of laboratory studies because fish can depth compensate;⁵⁴ this preference, however, does not address Ecology's reason for denying the rulemaking petition, namely, the detrimental effects of TDG on aquatic organisms residing in the top of the water column that are unable to use depth compensation to avoid TDG. Therefore, contrary to Northwest Sportfishing's contention, Parametrix's preference does not conclusively establish the superior validity of field studies over laboratory studies for purposes of our appellate review of Ecology's decision. Nor did the Schrank study conclude that laboratory studies are less valid than field testing.⁵⁵

Northwest Sportfishing also cites the Columbia River Inter-Tribal Fish Commission AMT comments to support its argument that laboratory studies are invalid for determining the effects of TDG on aquatic organisms unable to depth compensate. The Columbia River Inter-Tribal Fish Commission, however, stated that laboratory studies "are not likely representative of conditions in the lotic,^[56] Columbia River" because TDG would dissipate below the dams before reaching

⁵⁴ Parametrix's literature review for the AMT report (1) expressly noted that fish studied in the field can depth compensate to avoid TDG effects, whereas fish cannot depth compensate in shallow laboratory studies; (2) acknowledged the difficulty in monitoring biological conditions in the field to understand TDG effects; and (3) advocated using field studies instead of laboratory studies because in field studies "fish generally have sufficient depth available to substantially reduce or eliminate their exposure to true TDG supersaturation." AR at 1962.12.

⁵⁵ Schrank observed that (1) its field study found no substantive gas bubble trauma or mortality in invertebrates at levels where fish suffered severely; and (2) laboratory studies found gas bubble trauma and mortality at these same TDG levels, leading to the conclusion that "*either* invertebrates are less affected than fish *or* our sampling and holding techniques were biasing our results." AR at 2197.48 (emphasis added). Schrank offered no opinion on which of these latter two conclusions was more likely.

⁵⁶ "Lotic" is defined as "of, relating to, or living in actively moving water (as in stream currents or waves)." Webster's Third New International Dictionary 1338 (2002).

shallow water. AR at 1831.5. The AMT report similarly acknowledges: “Salmon usually migrate close to the shore where the TDG levels are usually less than in the thalweg^[57].” AR at 1917.52. And the Toner study reported that TDG can be 6 to 8 percent lower in the shallow areas of the Columbia River, compared to the mid-river areas where many resident species occupy those shallow near shore areas.

In its AMT report and in denying Northwest Sportfishing’s rulingmaking petition, Ecology relied heavily on laboratory studies that provided strong evidence against modifying the 115 percent TDG forebay standards. Nevertheless, despite some contrary non-conclusive field evidence, neither Northwest Sportfishing’s arguments nor the record show that Ecology acted without reason in relying on these laboratory studies to conclude that aquatic life within one meter of the surface would be harmed by modifying the 115 percent TDG forebay standard. Because the record is unclear about whether species occupying the top meter of the water column live exclusively in or near shore areas where TDG is lower, Ecology did not act arbitrarily and capriciously in declining to change TDG standards in the absence of more definitive evidence.

We reiterate that on appellate review, we must give Ecology “wide discretion” in determining whether its denial of a rulemaking petition was made through a process of reason. *Rios*, 145 Wn.2d at 507. Ecology reached its decision after considering hundreds of studies in its own literature review, the results of two other literature reviews, and input from other parties. Northwest Sportfishing has not shown that Ecology failed to use a reasoned process in

⁵⁷ “Thalweg” is defined as “a line following the lowest part of a valley whether under water or not.” Webster’s Third New International Dictionary 2367 (2002).

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concluding that modifying the 115 percent TDG forebay standard posed significant likely harm to aquatic life unable to depth compensate.⁵⁸ *See Rios*, 145 Wn.2d at 501. Accordingly, we hold that Ecology did not act arbitrarily and capriciously in denying Northwest Sportfishing's petition for rule making. We affirm.⁵⁹

Hunt, J.

We concur:

Worswick, C.J.

Van Deren, J.

⁵⁸ More specifically, although Northwest Sportfishing established that many species occupy the shallow areas of the rivers where TDG levels are usually lower, it failed to establish that no aquatic species occupy other areas of the river. Therefore, Northwest Sportfishing does not satisfy its burden to show that Ecology acted arbitrarily and capriciously by considering laboratory studies when studying the effects of TDG on aquatic organisms residing within one meter of the surface. RCW 34.05.570(1)(a).

⁵⁹ Because Northwest Sportfishing does not prevail, we deny its request for attorney fees under RCW 4.84.340-.360.