UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

THE CONSOLIDATED SALMONID CASES	1:09-CV-01053 OWW DLB 1:09-CV-01090 OWW DLB 1:09-CV-01373 OWW DLB 1:09-CV-01520 OWW SMS 1:09-CV-01580 OWW DLB 1:09-CV-01625 OWW SMS
SAN LUIS & DELTA-MENDOTA WATER AUTHORITY; WESTLANDS WATER DISTRICT v. GARY F. LOCKE, as Secretary of the United States Department of Commerce; *et al.* (1:09-cv-01053-OWW-DLB)	MEMORANDUM DECISION RE CROSS MOTIONS FOR SUMMARY JUDGMENT (DOCS. 430, 435, 446, 474, 477)
STOCKTON EAST WATER DISTRICT, *et al.* v. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, *et al.* (1:09-cv-01090-OWW-DLB)	
STATE WATER CONTRACTORS v. GARY F. LOCKE, *et al.* (1:09-cv-01378-OWW-SMS)	
KERN COUNTY WATER AGENCY, *et al.* v. UNITED STATES DEPARTMENT OF COMMERCE, *et al.* (1:09-cv-01520-OWW-SMS)	
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I. INTRODUCTION

These consolidated cases arise out of continuing efforts to protect several species listed under the Endangered Species Act ("ESA"), namely the endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ("winter-run"), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*) ("spring-run"), threatened Central Valley steelhead (*O. mykiss*) ("CV steelhead"), threatened Southern Distinct Population Segment ("DPS") of North American green sturgeon (*Acipenser medirostris*), and endangered Southern Resident killer whales (*Orcinus orca*) (collectively, "Listed Species"); and associated impacts to the water supply for more than half the State of California.

Plaintiffs, San Luis & Delta Mendota Water Authority and Westlands Water District; State Water Contractors ("SWC"); Kern County Water Agency and Coalition for a Sustainable Delta; and Metropolitan Water District of Southern California ("MWD" or "Metropolitan") (collectively "Export Plaintiffs") move for summary judgment on their claims that the United States National Marine Fisheries Service's ("NMFS") June 4, 2009 Biological Opinion, addressing the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") (collectively the "Project") on the Listed Species ("2009 Salmonid BiOp" or "BiOp") and its Reasonable and Prudent Alternative ("RPA"), violates the ESA and the

Administrative Procedure Act ("APA"). Doc. 430.[1] Plaintiffs Stockton East Water District, Oakdale Irrigation District, and South San Joaquin Irrigation District ("Stanislaus River Plaintiffs" or "SR Plaintiffs") filed a separate motion for summary judgment, raising unique challenges to the BiOp. Doc. 435. Plaintiff-in-Intervention, the California Department of Water Resources ("DWR") filed a separate motion for summary judgment on narrower grounds. Doc. 446.

Federal Defendants, the United States Department of Commerce ("DOC"), the National Oceanic and Atmospheric Administration ("NOAA"), the agency within DOC of which NMFS is a part, NMFS, the United States Department of the Interior ("DOI"), and its sub-agency the United States Bureau of Reclamation ("Reclamation"), oppose and cross move for summary judgment on all remaining claims, Doc. 477, as do Defendant-Intervenors California Trout, Friends Of The River, Natural Resources Defense Council, Northern California Council of the Federation of Fly Fishers, Pacific Coast Federation of Fishermen's Associations/Institute for Fisheries Resources, Sacramento River Preservation Trust, San Francisco Baykeeper, The Bay Institute, and the Winnemem Wintu Tribe, Doc. 474. All parties filed replies. Docs. 487, 492, 513, 515. These cross motions, which included over 700 pages of briefing and thousands of pages of supporting declarations and exhibits, came on for hearing on December 16 and 17, 2010.

[1] Export Plaintiffs previously prevailed on their claims that the Bureau of Reclamation violated the National Environmental Policy Act ("NEPA") by failing to perform any NEPA analysis prior to provisionally adopting and implementing the BiOp and its RPA. Doc. 288.

II. BACKGROUND

A. The Listed Species.

1. Sacramento River Winter-Run Chinook Salmon.

Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ("winter-run") is listed as "endangered" under the ESA. 70 Fed. Reg. 37,160 (June 28, 2005). Historical winter-run population estimates were as high as approximately 230,000 fish in the 1960s, BiOp at 82, but declined to under 200 fish in the 1990s. *Id.* at 81. In recent years, population surveys of winter-run estimated a high of 17,344 fish in 2006, followed by a decline in 2007 (2,542 fish) that persisted into 2008 (2,830 fish). *Id.*[2]

Adult winter-run Chinook salmon migrate upstream from the Pacific Ocean through the Bay-Delta estuary during November through July, moving upstream past Red Bluff Diversion Dam ("RBDD") from mid-December through early August, with peak passage occurring in mid-March. BiOp at 80. Spawning typically occurs in the mainstem Sacramento River downstream of Keswick Dam during April through August, with the greatest spawning activity typically taking place during May and June. *Id.*

Winter-run fry begin to emerge from the gravel beds where eggs are laid in late June and early July, continuing through October. *Id.* Juvenile rearing and emigration typically occurs between July and February in the upper Sacramento River, with juvenile migration

[2] More recent population figures were presented during hearings on motions for injunctive relief; only data available at the time the BiOp was issued has been considered.

downstream past RBDD beginning as early as mid-July, peaking in September, and continuing through March in some years. *Id.* at 80-81.

Juvenile winter-run occur in the Delta from November through May. *Id.*; *Pac. Coast Fed'n of Fishermans' Ass'ns. v. Gutierrez* ("*Gutierrez II*"), 606 F. Supp. 2d 1195, 1216-17 (E.D. Cal. 2008). Winter-run juveniles typically remain in the Delta until they reach a fork length of approximately 118 millimeters and are from 5 to 10 months of age. BiOp. at 81. Juveniles begin exiting to the ocean as early as November and continue to do so through May. *Id.*

Designated critical habitat for winter-run includes the Sacramento River, the Delta, and downstream bays to the Golden Gate Bridge. 58 Fed. Reg. 33,212 (June 16, 1993). *Gutierrez II*, 606 F. Supp. 2d at 1217. The following physical and biological features are identified as essential for the conservation of winter-run:

> (1) access from the Pacific Ocean to appropriate spawning areas in the upper Sacramento River, (2) the availability of clean gravel for spawning substrate, (3) adequate river flows for successful spawning, incubation of eggs, fry development and emergence, and downstream transport of juveniles, (4) water temperatures between 42.5 and 57.5°F for successful spawning, egg incubation, and fry development, (5) habitat areas and adequate prey that are not contaminated, (6) riparian habitat that provides for successful juvenile development and survival, and (7) access downstream so that juveniles can migrate from spawning grounds to San Francisco Bay and the Pacific Ocean.

BiOp at 90. Currently, the value of winter-run critical habitat is "degraded," by, among other things, the presence of dams, temperature control issues on the upper Sacramento River, unscreened diversions, and degraded spawning and riparian habitat. *Id.* at 93.

2. Spring Run Chinook.

Central Valley spring-run Chinook salmon (*O. tshawytscha*) ("spring-run") is listed as "threatened" under the ESA. 71 Fed. Reg. 834 (June 5, 2005); 70 Fed. Reg. 37160 (June 28, 2005) (critical habitat designated). There are three "independent" populations of spring-run, located on Butte, Deer and Mill Creeks, several "dependent" populations (which rely on the three independent populations for continued existence), and a population of hatchery fish from the Feather River Hatchery (FRH). BiOp at 93-94.

Spring-run Chinook have been declining over recent years. The Central Valley as a whole is estimated to have supported spring runs as large as 600,000 fish between the late 1880s and 1940s. *Id.* at 94. The 2007 escapement was 7,819 for all tributary populations (all independent and dependent populations, excluding those fish returning to FRH). *Id.* at 97.

Adult spring-run enter freshwater in the spring, beginning in late January, entering the Sacramento River between March and September, primarily in May and June, and entering spawning grounds between mid-April and mid-June. *Id.* at 93. Adults hold over the summer in cool, high elevation streams while they sexually mature, and then spawn in the fall, between September and October, depending on water temperatures. *Id.* at 93.

Juveniles typically spend a year or more in freshwater before emigrating to the ocean. *Id.* at 93. The emigration period for

spring-run extends from November to June and is highly variable. *Id.* at 94.

Designated critical habitat for spring-run includes the Sacramento River, tributaries supporting spring-run, the Delta, and downstream bays to the Golden Gate Bridge. *Gutierrez II*, 606 F. Supp. 2d at 1217. The value of spring-run critical habitat currently is "degraded." BiOp at 101, 104.

3. Central Valley Steelhead.

Central Valley steelhead (*O. mykiss*) ("CV steelhead") is listed as "threatened" under the ESA. 71 Fed. Reg. 834 (Jan. 5, 2006). Wild CV steelhead are confined mostly to the upper Sacramento River and its tributaries. BiOp at 107. Recent surveys also have detected small, self-sustaining populations on the Stanislaus, Mokelumne, and Calaveras Rivers, as well as observations of juvenile steelhead on the Tuolumne and Merced Rivers. *Id.* These small populations make up the remaining representatives of the Southern Sierra Nevada Diversity Group ("SSNDG") of CV Steelhead. *Id.* at 198.

While there is limited information on population size, NMFS estimates that the current population for the entire distinct population segment ("DPS")[3] (including the SSNDG as well as all other populations) in the Central Valley is less than 3,628 spawning

[3] The term "species" includes "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532. NMFS has issued guidance on how to apply the ESA's DPS concept, *see Modesto Irr. Dist v. Gutierrez*, 619 F.3d 1024, 1028 (9th Cir. 2010) (citing 56 Fed. Reg. 58,612 (Nov. 20, 1991)), and has "struggled for two decades over how to apply the term DPS to steelhead," *id.*

females, compared with 40,000 spawners in the 1960s. BiOp at 106. The CV Steelhead population has shown a pattern of negative growth since the late 1960s, and there is no indication that the trend has changed. BiOp at 108-09 & Figures 4-4 & 4-5.

CV steelhead generally leave the ocean from August through April and spawn from December through April in small streams and tributaries where cool, well-oxygenated water is available year-round. *Id.* at 104. Unlike Pacific salmon, steelhead are capable of spawning more than once before death. Although one-time spawners are the great majority, approximately 17.2 percent in California streams are repeat spawners. *Id.* at 103-104.

Steelhead eggs hatch approximately 30 days after spawning, and fry emerge from the gravel four to six weeks later into shallow areas where they feed. *Id.* at 105. Steelhead rear during the summer and emigrate "episodically" from their natal streams during fall, winter, and spring high flows. *Id.* at 106. Emigrating CV Steelhead use the lower reaches of the Sacramento River and Delta for rearing and as a migration corridor to the ocean. *Id.* Juvenile CV steelhead typically emigrate through the Delta from late September through June. *Id.* at 105 (Table 4-6).

Approximately 80% of historical CV Steelhead range is blocked by dams. *Id.* at 109. CV steelhead critical habitat is degraded. *Id.* at 113.

4. Green Sturgeon.

The southern distinct population segment of the North American green sturgeon ("green sturgeon") (*Acipenser medirostris*) is listed as "threatened" under the ESA. 71 Fed. Reg. 17757 (Apr. 7, 2006); 73 Fed. Reg. 52,084 (critical habitat designated).

Green sturgeon are anadromous fish that spawn and rear in freshwater rivers and estuaries but spend most of their lives in the ocean. *See* BiOp at 114-15. They are a long-lived, slow-growing species. 68 Fed. Reg. 4,433, 4,436 (Jan. 29, 2003). Juvenile green sturgeon are present in the Delta year round. BiOp at 119.

There are no definitive population counts or figures for the Southern DPS green sturgeon. Evidence available at the time the BiOp was written suggests that the population in the Delta watershed is "relatively small," ranging from several hundred to a few thousand adults. *Id.* at 124.

Critical habitat for the Southern DPS of green sturgeon was proposed on September 8, 2008, 73 Fed. Reg. 52,084, but had not been adopted as of the issuance of the BiOp. Proposed critical habitat included "approximately 325 miles of riverine habitat and 1,058 square miles of estuarine habitat in California, Oregon, and Washington, and 11,927 square miles of coastal marine habitat off California, Oregon, and Washington within the geographical area presently occupied by the Southern DPS of green sturgeon." BiOp at 126. In addition, approximately 136 square miles of habitat within the Yolo and Sutter

bypasses, adjacent to the Sacramento River, are proposed for designation. *Id.* The BiOp concluded that the current condition of proposed critical habitat for the Southern DPS of green sturgeon is "degraded over historical conditions." *Id.* at 134.

5. Southern Resident Killer Whale.

The Southern Resident DPS of killer whale (*Orcinus orca*) ("Southern Residents") was listed as "endangered" under the ESA on November 18, 2005, 70 Fed. Reg. 69,903 (Nov. 18, 2005), and the DPS is designated as "depleted" under the Marine Mammal Protection Act. BiOp at 158-59. Southern Residents are found throughout the coastal waters off Washington, Oregon, and Vancouver Islands and are known to travel as far south as central California. *Id.* at 159.

The BiOp addresses the impact of Project operations on Southern Residents and concludes that extinction of winter-run and spring-run Chinook salmon, as well as reductions in fall-run[4] Chinook salmon populations, "would reduce prey availability and increase the likelihood for local depletions of prey in particular locations and times," which would, in turn, increase the risk of extinction of the Southern Residents. BiOp at 573-74.

B. The 2009 Salmonid BiOp and RPA.

The 2009 Salmonid BiOp, prepared pursuant ESA § 7, 16 U.S.C. § 1536(a)(2), concluded that "the long-term operations of the CVP and SWP are likely to jeopardize the continued existence" of the Listed

[4] Fall-run Chinook salmon are not listed as threatened or endangered under the ESA.

Species and "destroy or adversely modify" critical habitat for winter-run, spring-run, and CV steelhead. BiOp at 575. As required by law, the BiOp includes an RPA designed to allow the projects to continue operating without causing jeopardy to the species or adverse modification to its critical habitat. *Id.* at 575-671. The RPA "is composed of numerous elements for each of the various project divisions and associated stressors," which, according to the BiOp, "must be implemented in its entirety to avoid jeopardy and adverse modification." *Id.* at 578. The BiOp provides a succinct overview of the RPA:

> There are several ways in which water operations adversely affect listed species that are addressed in this RPA. We summarize the most significant here:
>
> 1) Water operations result in elevated water temperatures that have lethal and sub-lethal effects on egg incubation and juvenile rearing in the upper Sacramento River. The immediate operational cause is lack of sufficient cold water in storage to allow for cold water releases to reduce downstream temperatures at critical times and meet other project demands. This elevated temperature effect is particularly pronounced in the Upper Sacramento for winter-run and mainstem spring-run, and in the American River for steelhead. The RPA includes a new year-round storage and temperature management program for Shasta Reservoir and the Upper Sacramento River, as well as long-term passage prescriptions at Shasta Dam and re-introduction of winter-run into its native habitat in the McCloud and/or Upper Sacramento rivers.
>
> 2) In Clear Creek, recent project operations have led to increased abundance of Clear Creek spring-run, which is an essential population for the short-term and long-term survival of the species. Nonetheless, in the proposed action, continuation of these operations is uncertain. The RPA ensures that essential flows and temperatures for holding, egg incubation and juvenile survival will be maintained.

3) Red Bluff Diversion Dam (RBDD) on the Sacramento River impedes both upstream migration of adult fish to spawning habitat and downstream migration of juveniles. Effects are significant for winter-run and spring-run, but are particularly pronounced for green sturgeon and its proposed critical habitat in that a significant portion of the population is blocked from its spawning and holding habitat. The RPA mandates gate openings at critical times in the short term while an alternative pumping plant is built, and, by 2012, opening of the gates all year.

4) Both project and non-project effects have led to a significant reduction in necessary juvenile rearing habitat in the Sacramento River Basin and Delta. The project's flood control operations result in adverse effects through reduced frequency and magnitude of inundation of rearing habitat. To minimize these effects, the RPA contains both short-term and long-term actions for improving juvenile rearing habitat in the Lower Sacramento River and northern Delta.

5) Another major effect of water operations is diversion of out-migrating juveniles from the north Delta tributaries into the interior Delta through the open DCC gates. Instead of migrating directly to the outer estuary and then to sea, these juveniles are caught in the interior Delta and subjected to pollution, predators, and altered food webs that cause either direct mortality or impaired growth. The RPA mandates additional gate closures to minimize these adverse effects to winter-run, spring-run, and steelhead.

6) Similarly, water pumping causes reverse flows, leading to loss of juveniles migrating out from the Sacramento River system in the interior Delta and more juveniles being exposed to the State and Federal pumps, where they are salvaged at the facilities. The RPA prescribes Old and Middle River flow levels to reduce the number of juveniles exposed to the export facilities and prescribes additional measures at the facilities themselves to increase survival of fish.

7) The effects analysis shows that juvenile steelhead migrating out from the San Joaquin River Basin have a particularly high rate of loss due to both project and non-project related stressors. The RPA mandates additional measures to improve survival of San Joaquin steelhead smolts, including both increased San Joaquin River flows and export curtailments. Given the uncertainty of the

> relationship between flow and exports, the RPA also prescribes a significant new study of acoustic tagged fish in the San Joaquin Basin to evaluate the effectiveness of the RPA and refine it over the lifetime of the project.
>
> 8) On the American River, project-related effects on steelhead are pronounced due to the inability to consistently provide suitable temperatures for various life stages and flow-related effects caused by operations. The RPA prescribes a flow management standard, a temperature management plan, additional technological fixes to temperature control structures, and, in the long term, a passage at Nimbus and Folsom Dams to restore steelhead to native habitat.
>
> 9) On the Stanislaus River, project operations have led to significant degradation of floodplain and rearing habitat for steelhead. Low flows also distort cues associated with out-migration. The RPA proposes a year-round flow regime necessary to minimize project effects to each life-stage of steelhead, including new spring flows that will support rearing habitat formation and inundation, and will create pulses that cue out-migration.
>
> 10) Nimbus Fish Hatchery steelhead program contribute to both loss of genetic diversity and mixing of wild and hatchery stocks of steelhead, which reduces the viability of wild stocks. The Nimbus and Trinity River Hatchery programs for non-listed fall-run also contribute to a loss of genetic diversity, and therefore, viability, for fall-run. The RPA requires development of Hatchery Genetics Management Plans to improve genetic diversity of both steelhead and fall-run, an essential prey base of Southern Resident.

Id. at 576-78.

III. 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 the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c). The claims in this case involve NMFS's issuance of a biological opinion, 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 APA judicial review 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.

IV. BASIC LEGAL FRAMEWORK

A. Review under the APA.

APA invalidation of a biological opinion requires Plaintiffs to prove that NMFS'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. U.S. Fish and Wildlife Serv., 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 Hearing Transcript ("Tr.")), 406, 407, 462, 740 (7/8/10 Tr.), 750, expert testimony has been considered solely 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. <u>Deference to Agency Expertise.</u>

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 citation and quotation 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).

> [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*, 626 F.3d 1040, 1048 (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.*

B. 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 NMFS[5] 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, NMFS must give the action agency a written biological opinion "setting forth [NMFS'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 NMFS determines that jeopardy or destruction or adverse modification of critical habitat is likely, NMFS "shall suggest those

[5] Generally, where the listed species in question is marine or anadromous, consultation must involve NMFS. For terrestrial and freshwater species, the United States Fish and Wildlife Service ("FWS") must be consulted.

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).

1. 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 Gutierrez II,* 606 F. Supp. 2d at 1144.

"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 scientific and commercial data available standard "recognizes that better scientific evidence will most likely always be available in the future"). 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) (internal quotation 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 [NMFS] to take action based on imperfect data, so long as the data is the best available"). NMFS "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. There, in the context of an ESA § 4 listing determination, NMFS "affirmatively relie[d] on ambiguous studies as evidence of persistence (i.e., stable and viable populations), and in turn argue[d] that this 'evidence' of persistence ... proves that the lizard's lost range is insignificant for purposes of the ESA." *Id.* The Ninth Circuit found this conclusion to be unreasonable because "[t]he studies do not lead to the conclusion that the [species] persists in a substantial portion of its range, and therefore cannot support [NMFS's] conclusion. *Id.*[6]; *see also Rock Creek Alliance v.*

[6] Export Plaintiffs repeatedly rely on *Tucson* to argue that NMFS erred by relying on "ambiguous studies" as affirmative proof of scientific fact. Federal Defendants suggest that Export Plaintiffs' reading of this holding is incorrect, and emphasize that the Ninth Circuit re-affirmed the general rule that "when examining decisions made under conditions of scientific uncertainty 'a reviewing court must be at its most deferential.'" *Tucson*, 566 F.3d at 879. Federal Defendants suggest that the holding in *Tucson* resulted from the special circumstances in that case, where FWS relied on a single study to affirmatively conclude that a species persisted in a

U.S. Fish & Wildlife Service, 390 F. Supp. 2d 993, 1008 (D. Mont. 2005) (rejecting section 7 biological opinion'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);

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significant portion of its range, even though that one study only addressed two discrete sections of the species' current range. Doc. 484 at 34 (citing *Tuscon*, 66 F.3d at 882). This is a distinction without a difference. *Tuscon* stands generally for the proposition that, while a court must be deferential in areas where there is scientific uncertainty, such deference is not unlimited. More specifically, an agency may not rely on an ambiguous study for affirmative proof of something the study does not establish.

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 [the conclusions of an environmental impact statement prepared under the National Environmental Policy Act] have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[]"). 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.

2. Best Available Science Standards and the Application of Analytical/Statistical Methodologies.

These 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. 2d 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.* (internal quotations omitted). 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).

V. EXPORT PLAINTIFFS' & DWR'S CLAIMS.

A. Alleged Clear Scientific Errors Pertaining to Delta Operations.

A major premise of the BiOp is that pumping "causes reverse flows, leading to loss of juveniles migrating out from the Sacramento River system in the interior Delta and more juveniles being exposed to the State and Federal pumps, where they are salvaged[7] at the facilities." BiOp at 577. The effects analysis also concluded "that juvenile steelhead migrating out from the San Joaquin River Basin have a particularly high rate of loss due to both project and non-project related stressors." *Id.* at 577-78. To mitigate for these impacts, the RPA "prescribes Old and Middle River flow levels to reduce the number of juveniles exposed to the export facilities and prescribes additional measures at the facilities themselves to increase survival of fish." *Id.* at 577. In addition, "to improve survival of San Joaquin steelhead smolts," the RPA prescribes "both increased San

[7] The State and Federal pumping facilities use louvers to divert salmonids entrained by the pumping process into collection tanks where operators attempt to "salvage" them by returning them to other areas of the Delta. BiOp at 341, 345.

Joaquin River flows and export curtailments." *Id.* at 578.

Plaintiffs strenuously argue that NMFS made certain "clear" scientific errors in reaching the conclusion that exports adversely affect juvenile salmonid survival.

1. Challenged Statistical Methodologies.

a. Use of Raw Salvage in Figures 6-65 and 6-66.

NMFS relied on salvage data provided by Plaintiff-Intervenor, DWR, presented in Figures 6-65 and 6-66 of the BiOp:

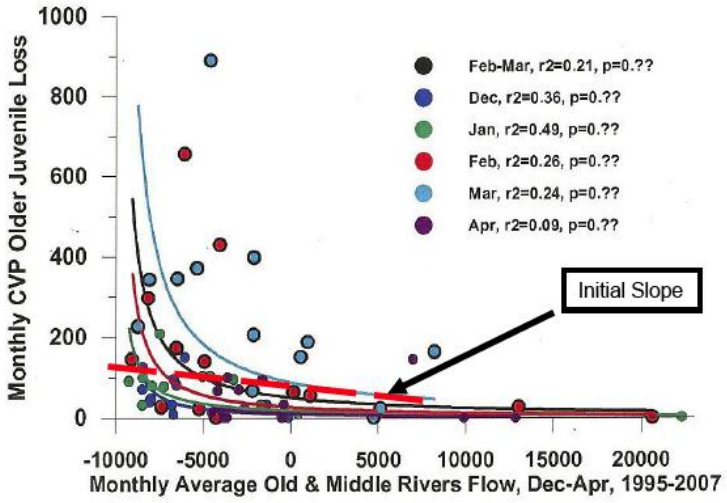

Figure 6-65. Relationship between OMR flows and entrainment at the CVP, 1995-2007 (DWR 2008).

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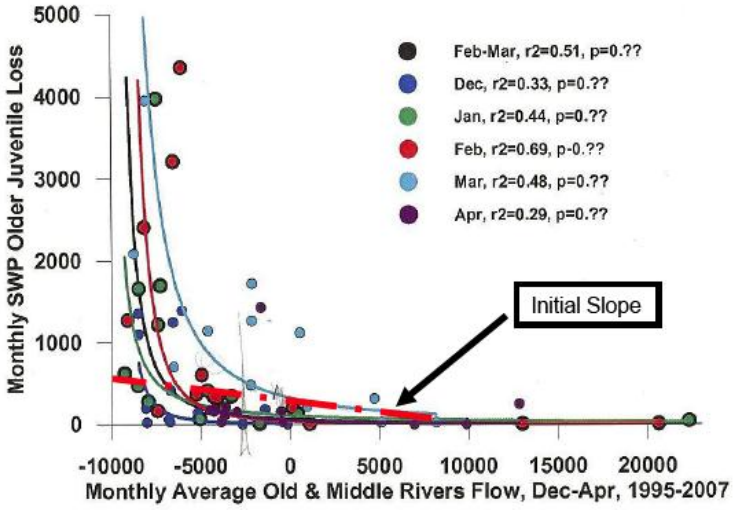

Figure 6-66. Relationship between OMR flows and entrainment at the SWP, 1995-2007 (DWR 2007).

Id. at 361-62. These figures were cited to demonstrate that "[l]oss of older juveniles at the CVP and SWP fish collection facilities increase sharply at [OMR] flows of approximately -5,000 cfs and depart from the initial slope at flows below this." *Id.* at 361. Federal Defendants' cross motion explains that NMFS used this data to "help evaluate where along the spectrum of OMR flows any significant change in salvage could be observed." Doc. 477-1 at 53.

These figures, which are based upon average salvage figures over many years, use "raw" salvage numbers that are not scaled to reflect the size of the population from which the fish were salvaged at the time the particular sample was taken. Previous rulings in this and the related *Consolidated Delta Smelt Cases* have discussed at length why the use of such data is not consistent with standard practice in the fields of fish biology and population dynamics. *See San Luis & Delta-Mendota Water Authority v. Salazar*, 760 F. Supp. 2d, 885-90

(E.D. Cal. 2010). The May 18, 2010 Findings of Fact and Conclusions of Law Re Plaintiffs' Request for Preliminary Injunction ("PI Decision") in this case found:

> 125. ...The comparisons of salvage to negative OMR flows relied upon in the BiOp utilize raw salvage numbers, rather than scaling salvage to population size. *See* Doc. 179, Declaration of Richard B. Deriso at ¶¶ 3-5. Scaling salvage to population size is standard fisheries science practice and could have been accomplished for several of the Listed Species based on existing population data. *See id.* at ¶¶ 5-6. This failure is a fundamental and inexplicable error. Salvage may have been higher in some years simply because the population was higher, not because of any differences in negative OMR flows. Salvage may have been lower in other years because the population was lower. Dr. Deriso demonstrated the potential significance of this failure by plotting the population adjusted Juvenile Chinook Incidental take rate against OMR flow. Based upon this revised analysis for spring-run and winter-run, Dr. Deriso concluded that there is no statistically significant relationship between the take index and OMR flows. *Id.* at ¶6.
>
> 126. The BiOp's conclusions reached about the spring-run and winter-run Chinook failed to utilize the best available scientific methodology, because population data was available at the time the BiOp was issued that would have permitted NMFS to perform the straightforward population adjustment required to conform to standard, generally accepted practices for fisheries population measurements utilized in their field of expertise. If, in those years when salvage was greatest, population sizes overall were 10 or 100 times larger than other years, the effects might not be jeopardizing. Without adjustment for population size, NMFS's reliance on that figure was arbitrary and capricious.
>
> 127. As to the CV steelhead, for which no population numbers are available, it is less clear whether the use of raw salvage numbers is always inappropriate. Figures 6-65 and 6-66 ambiguously reference monthly CVP and SWP "Older Juvenile Loss" on the y axis. Were most of the salvaged fish represented on these charts Chinook salmon? No reason is offered why NMFS did not segregate the steelhead figures from those of Chinook salmon. If the species had been evaluated separately, would it have been reasonable for NMFS to fail to adjust the steelhead figures for population size?

Separate analysis was not done.

Consol. Salmonid Cases, **713 F. Supp. 2d 1116, 1142-43 (E.D. Cal. 2010) (emphasiss added).**

Federal Defendants attempt to explain their use of these figures in two ways. First, Jeffrey Stuart, NMFS Fisheries Biologist and the primary author of the Delta section of the BiOp, opines that "the general trend in fish loss should still be apparent regardless of scaling." Fourth Stuart Decl., Doc. 485 at ¶ 72. He insists that this data "indicates that additional loss of fish occurs with increasing export levels as measured by the OMR flow values." ***Id.*** **This explanation simply defies common sense. When trying to discern trends from data points that range across many years, an obvious "confounding variable" is population size. A trend observed in data that is unscaled for population size may change or completely disappear when scaled for population size.** ***See*** **Deriso Decl., Doc. 440 at ¶¶ 13 - 31. Federal Defendants had the information needed to perform such a simple analysis of the available data, but did not do so, and unjustifiably relied on the unscaled data to form a quantitative conclusion that salvage rates increased sharply above -5,000 cfs OMR. This was a clear scientific error.**

Defendant-Intervenors argue that the agency cannot violate the ESA by failing to take an additional step to scale the salvage data to salmonid population abundance. They maintain that all the ESA requires is that NMFS consider the "available" evidence not that it

create new data or "follow scientific practices defined by Export Plaintiffs experts." Doc. 484 at 51. It is true that the best available science standard does not require NMFS to create new data or apply new models to existing data, *Building Indus. Ass'n*, 247 F.3d at 1246. However, here, NMFS put data to a use for which it is not appropriate, as it produces unreliable results. *Cf. NWF v. EPA*, 286 F.3d at 565 (a court may reject agency's choice of model when it "bears no rational relationship to the characteristics of the data to which it was applied"). Every biostatistics expert who presented evidence in this and related fish cases has agreed that it is wholly inappropriate and scientifically unreasonable to draw management conclusions from a plot comparing unscaled salvage data to OMR flows collected over a period of years when population varied. The agency is required to apply generally recognized and accepted biostatistical principles, which constitute best available science, in reaching its decisions.

b. Was the BiOp's Reliance on Figures 6-65 and 6-66 Harmless?

Alternatively, Federal Defendants argue that any such error was harmless given the other record evidence that supports the BiOp's conclusions. No party has provided authority that a harmless error rule applies when the agency commits a substantive error under the ESA.[8] *Arguendo*, Defendants' alternative evidence is considered.

[8] ESA procedural errors are subject to a harmless error analysis. *See Idaho Farm Bureau Fed'n v. Babbitt*, 58 F.3d 1392, 1405 (9th Cir. 1995).

(1) Record Citations Provided by Mr. Stuart.

Mr. Stuart states: "[a]dditional assessment of the effects of the OMR flow levels on salmon loss was derived from data provided by NMFS staff for the BDCP. NMFS 79238-239; 79240-83808; 90852-98." Fourth Stuart Decl., Doc. 485 at ¶ 73. These are several thousand pages of documents. Mr. Stuart does not explain how the voluminous referenced information was used or analyzed. It is impossible to determine whether these referenced pages provide a sufficient alternative basis for the BiOp's conclusions. NMFS has provided no explanation for an alternative to its scientifically unreliable conclusions. *Humane Soc. v. Locke*, 626 F.3d at 1048 (holding NMFS did not offer a satisfactory explanation for its findings); *Am. Turnboat Ass'n*, 738 F.2d at 1016 (finding that despite broad discretion afforded NOAA, where record evidence detracts from that relied upon by the agency, a court may find the agency's decision arbitrary and capricious). Citing this information and then failing to explain it is arbitrary and capricious.

(2) Particle Tracking Model Results.

The BiOp also relied on outputs from computer model runs utilizing the so-called Particle Tracking Model ("PTM"). Export Plaintiffs' and DWR's 2010 PI Motion challenged the use of PTM, arguing that while PTM is useful to track the fate of neutrally buoyant particles, it does not accurately reflect the behavior of salmonids, which are strong, volitional swimmers. These challenges

were rejected in the May 18, 2010 PI Decision on the grounds that the BiOp acknowledged the limitations of PTM and reasonably relied on PTM studies to support certain conclusions:

> 120. This is a dispute among scientists. While DWR criticizes PTM modeling, Stuart and NMFS recognized its limitations and found PTM studies helpful to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), particle entrainment increases from 10% at -2,500 cfs, to 20% at -3,500 cfs, to 40% at -5,000 cfs, and 90% at -7,000 cfs. NMFS, through Mr. Stuart, took into account inherent differences in the movement of neutrally buoyant particles and their speed and direction of travel. Administrative law requires deference to the Agency. Additional record analysis is necessary to determine the extent of support for NMFS's additional opinion that exports affect salmonid survival.

Cosol. Salmonid Cases, 713 F. Supp. 2d at 1141. These challenges are discussed in other sections of this decision. Here, it is sufficient to note that the PTM results are not a complete replacement for Figures 6-65 and 6-66, as they only explain how particles, not actual fish, would respond to increased OMR flow. Nor do Federal Defendants point to any other information in the record that delineates "where along the spectrum of OMR flows any significant change in salvage could be observed," the purposes for which Federal Defendants use 6-65 and 6-66.

The same reasoning applies to acoustic tag studies and other data the BiOp relies upon. This other data was treated in the May 18, 2010 decision and below in greater detail. It is undisputed that none of these studies or additional data pinpoint for management purposes at

what point negative OMR flows must be controlled. Doc. 347 ¶¶ 128-138.

It is not appropriate to speculate how NMFS's analysis and/or conclusions would have changed had the data used in figures 6-65 and 6-66 been scaled to population size. This must be done on remand.

Whether there is sufficient data to scale CV steelhead salvage information to population size is unclear. *Compare* BiOp at 107 (discussing existing population data and difficulties posed by "lack of monitoring program") *with* Doc. 431 at 11 (citing Burnham Decl., Doc. 439 at ¶ 42 ("NMFS has access to the number of hatchery-produced salmon each year), for the proposition that NMFS had "readily available" data regarding how many CV Steelhead were released from hatcheries each year)). That scaling for population size may not be possible for all species may limit NMFS's efforts. If population data is unavailable for certain species, the agency must nevertheless explain how it can make management conclusions without such information. The extent to which any such limitations mitigate NMFS's failure to scale raw salvage data cannot be discerned from the present record.

(3) Figures 6-71, 6-72, and 6-73.

The BiOp also relies on a series of plots, taken directly from Reclamation's Biological Assessment ("BA" or "OCAP BA"), of monthly juvenile salmonid "loss" against average exports. The first set of plots, Figure 6-71, depicts loss of juvenile Chinook salmon versus

average monthly CVP and SWP exports for a period from 1995 through 2007.

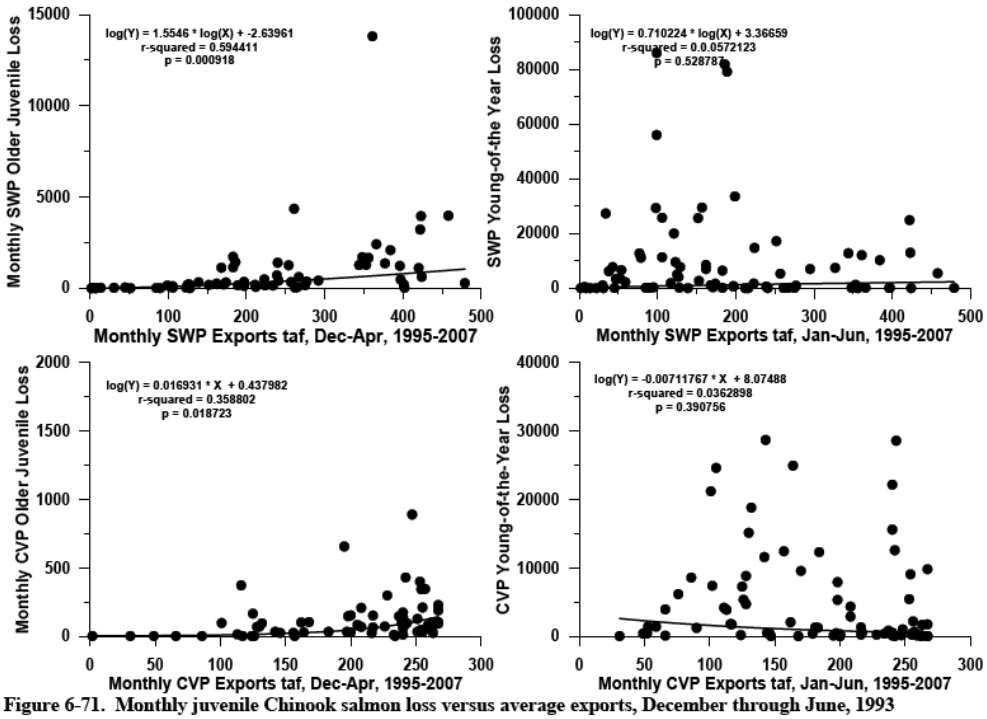

Figure 6-71. Monthly juvenile Chinook salmon loss versus average exports, December through June, 1993 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 13-40).

BiOp at 370. This plot was specifically cited as quantitative evidence of a relationship between exports and loss at the pumps:

> The CVP/SWP operations BA presented data that regressed the loss of older juvenile Chinook salmon against exports (figure 6-71) and found that a significant relationship existed. The relationship was stronger for exports at the SWP (p = 0.000918) than for exports at the CVP (p = 0.0187). The months of December through April resulted in the most informative relationship based on the historical number of older juvenile Chinook salmon salvaged each month and the relationship of each month to salvage and exports. Conversely, regressions performed for monthly salvage of YOY Chinook salmon against exports did not result in a significant relationship at either the SWP or CVP facilities....

Id. at 368-69. In this way, the BiOp used Figure 6-71 as quantitative evidence of a statistically significant connection

between loss of older juvenile Chinook salmon and export levels. These plots suffer from the same flaw of mis-using raw salvage data. They must be re-analyzed and explained on remand if they are to be used as scientific justification for the BiOp's conclusions.

Figures 6-72 and 6-73 present a more difficult issue, as they concern CV steelhead salvage, for which much less data is available. Figure 6-72 plots monthly CV Steelhead salvage (both clipped/hatchery and unclipped/wild[9]) against exports:

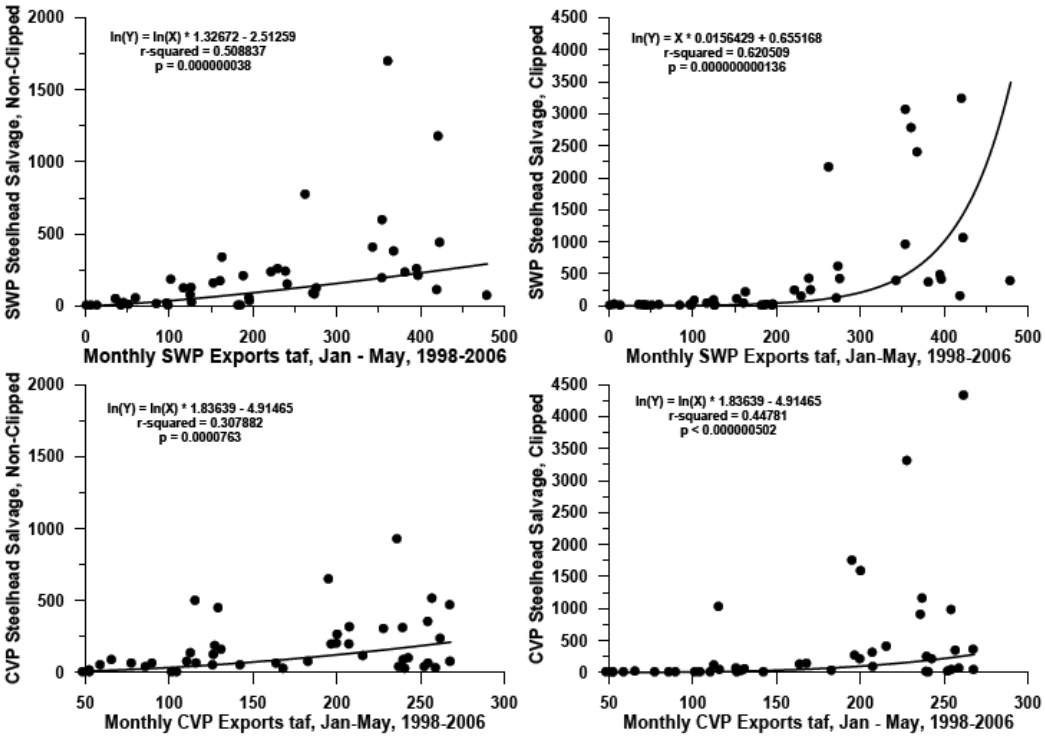

Figure 6-72. Monthly steelhead salvage versus average exports, January through May, 1998 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 13-45).

Id. at 371. The BiOp indicates that these "regressions resulted in significant relationships between exports and salvage of steelhead at

[9] The term "unclipped" refers to wild fish with intact adipose fins, while "clipped" fish have had their adipose fins clipped before release from a hatchery. BiOp at 337

the facilities, more so for the SWP than the CVP." *Id.* at 369. Figure 6-73 plots monthly CV Steelhead salvage against the monthly average export to inflow ratio, finding significant relationships:

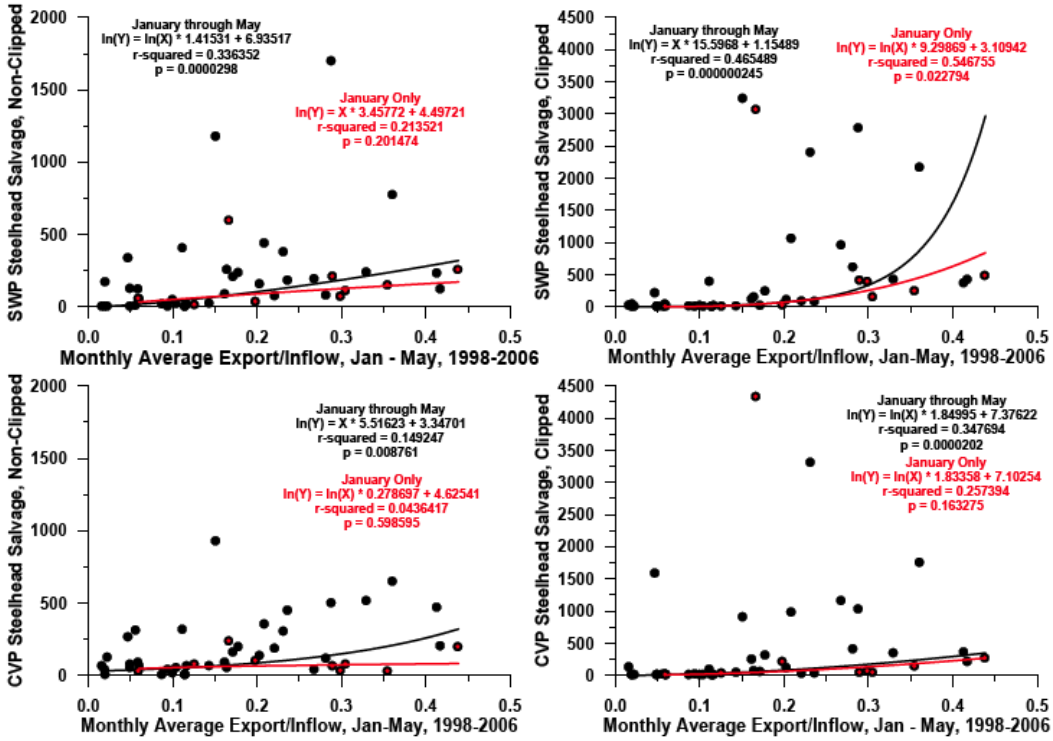

Figure 6-73. Monthly steelhead salvage versus average Export/Inflow ratio in TAF, January through May, and January alone, 1998 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 13-46).

Id. at 370-71. The 2010 PI Decision found that "[a]s to the CV steelhead, for which no population numbers are available, it is less clear whether the use of raw salvage numbers is always inappropriate." *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1143. Export Plaintiffs do not explain how it would be possible to scale to overall population size the wild CV steelhead salvage data, referenced in Figure 6-73 as "unclipped" CV steelhead. However, plaintiffs point out that the exact number of hatchery CV steelhead released each year is known, and therefore argue that NMFS could have scaled the hatchery or "clipped"

CV Steelhead data to population size. Doc. 431 at 11. Federal Defendants do not respond to this assertion. There appears to be no reason to distinguish between the clipped CV steelhead analyses and Chinook salmon analyses, for which population scaling is the best available scientific methodology.

More importantly, Federal Defendants do not explain how these figures, even if valid, serve the same purpose as Figures 6-65 and 6-66, which were cited to demonstrate that "[l]oss of older juveniles at the CVP and SWP fish collection facilities increase sharply at [OMR] flows of approximately -5,000 cfs and depart from the initial slope at flows below this." *Id.* at 361.

None of the alternative bases offered by Federal Defendants are sufficient to render NMFS's reliance on Figures 6-65 and 6-66 "harmless error." The significance of Mr. Stuart's voluminous record citations is unexplained. Neither the PTM Modeling Results, nor Figures 6-71, 6-72, or 6-73 provide alternative bases for NMFS's conclusions regarding the negative OMR flows below which loss of juvenile salmonids "increases sharply." Export Plaintiffs' motion for summary judgment that Federal Defendatns acted unlawfully by relying on raw salvage analyses is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. Separate Challenges to Statistical Analyses in Figures 6-71, 6-72, and 6-73.

Export Plaintiffs also maintain that all three sets of graphs misrepresent the statistical significance of the data because "the

decision to divide the data by month created an arbitrarily large sample size." Doc. 431 at 10. According to Export Plaintiffs, this "produce[d] facially incredible P-values (the standard statistical measure of significance) that misrepresented the validity of the models that were fit to the data." *Id.* A P-value "represents the probability that the result obtained in a statistical test is due to chance rather than a genuine relationship between the variables." Burnham Decl., Doc. 439 at ¶ 43. Regression analysis is generally considered statistically significant when the P-value is smaller than 0.05. *Id.*

The upper right graph from Figure 6-72, which plots monthly SWP exports for January through May of 1998 through 2006 against the raw salvage of hatchery steelhead, presents a P-value of 0.000000000136. This is several million times smaller than 0.05. Dr. Burnham opines that while "[s]uch a P-value is not impossible ... it would be surprising and especially so with this graph" because "[t]he scatter of the data points indicates that the regression is not a very good fit." *Id.* at ¶ 44.

Dr. Burnham describes the R^2 value of 0.62 as not very strong. The R^2 value is a statistical measure of how well the regression explains the data. "Roughly speaking an R^2 of 0.5 means that the regression accounts for 50% of the variation observed in the data, while the other 50% is explained by other, unknown factors. Generally speaking an R^2 of 0.5 is considered weak, while an R^2 of 0.8 or above

is considered strong." *Id.* at ¶ 36.

Dr. Burnham opined that this high level of apparent "significance" is the result of treating each of the monthly export points as an independent data point, which increases the sample size and influences the P-value. *Id.* at ¶ 45. Because the monthly data is "highly correlated with each individual year, due to the unique natural conditions that characterize each year, such as the abundance of the salmon cohort, patterns of flow, changes in temperature, etc." *Id.* at 47. Dr. Burnham offers a helpful explanation of why this is a problem:

> For example, a medical researcher could misrepresent the significance of a drug study by performing [a] test on 10 people, and then treating the results for each individual person as if that person was 100 people. If the initial result of the test on 10 people was that 80% had been cured by the drug, nothing would change by acting as if the test had been performed on 1000 people: 80% would still be cured. However, the study would appear more significant because of the claim the results were true for a 1000 people rather than 10 people.

Id. at ¶ 46. In the present case, Dr. Burnham opines that NMFS's approach caused the relationship between exports and salvage to "appear more significant than it really is," when in fact "the high salvage levels in [certain] years may have actually been primarily caused by one independent factor, such as a large hatchery release that year." *Id.* at ¶ 49. The results of the "January Only" data depicted in red on Figure 6-73, are different, showing much higher P-values, with only one of the four graphs showing statistical significance. *Id.* at 51.

Mr. Stuart responds to these critiques in his Fourth Declaration:

> ... Dr. Burnham critiques the statistical analysis of the data that was presented to NMFS in the biological assessment by DWR. NMFS reported the data presented by DWR in the BA as it was written without altering its content. While the probability of the regressions lines is unusual, having an unusually low "p" value, this is not a reason to completely disregard the data because the general trend of the lines is consistent with trends previously seen in consultations and reports provided to NMFS. This data is also consistent with the results of the radio tagged salmon studies conducted by Vogel in the South Delta in 2000 and 2001 in which tagged fish were drawn to the export facilities in higher numbers when exports were high as compared to lower levels of exports (Vogel 2002 cited in Vogel 2004). NMFS regarded the trends as more explanatory biologically than the accuracy of the statistical analysis being reported.

Doc. 485 at ¶ 75. Mr. Stuart now argues that the trend lines have biological significance even if the statistical analyses were incorrectly performed. Yet, the BiOp specifically emphasizes how these graphs demonstrated "significant relationship[s]" between the variables. *See, e.g.,* BiOp at 369.

Mr. Stuart also provides a substantive rebuttal to Dr. Burnahm's critique of the statistical analyses, premised on Dr. Burnham's argument that it was clear error to use monthly data points in the correlation analysis because they are highly correlated within years. Mr. Stuart opines that this premise is flawed because "[m]onthly exports do not necessarily correlate with each other between months or between years." Fourth Stuart Decl., Doc. 485 at ¶ 76.

> For example, exports in March do not correlate with exports in April and May from 2000 to 2006, as Dr. Burnham has alleged, since exports are curtailed in April and May for the VAMP experiment during this time period. So regardless of what the March pumping rate is, the exports in April and May will be lower. Likewise, exports in January are allowed to reach a maximum of 65 percent of the inflow to the Delta,

> while exports from February through June are only allowed to reach a maximum of 35 percent of inflow.

Id. This provides a partial explanation for the statistical analyses.

This is an area of disagreement among experts. The agency is due deference in such circumstances, unless its experts' opinions are unsupported or wrong. *Cactus Corner, LLC v. U.S. Dept. of Agric.*, 346 F. Supp. 2d 1075, 1113 (E.D. Cal. 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.

Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 378 (1989) (explaining in the context of an agency's decision not to supplement a NEPA environmental impact statement that "courts should not automatically defer to the agency's express reliance on an interest in finality without carefully reviewing the record and satisfying themselves that the agency has made a reasoned decision based on its evaluation of the significance-or lack of significance-of the new information" and noting that "[a] contrary approach would not simply render judicial review generally meaningless, but would be contrary to the demand that courts ensure that agency decisions are founded on a reasoned evaluation "of the relevant factors").

This is a close call. Dr. Burnham's opinion suggests that it was unreasonable for NMFS to rely on the statistical analyses it performed. Mr. Stuart offers some explanation to counter certain

aspects Dr. Burnham's critique, but does not satisfactorily explain the anomalous statistical results. Because the BiOp's reliance on these graphs must be remanded for other reasons, the agency must explain the flaws in its approach to the statistical analyses on remand.

2. Failure to Perform a Population-Level Quantitative Analysis.

Plaintiffs maintain that the BiOp violated the best available science requirement because it failed to employ a "population-level quantitative analysis." Doc. 431 at 15. It is undisputed that quantitative population dynamics models, or life cycle models, are the most reliable method to evaluate the impacts of various stressors on a fish population. This has been indisputably established in these related cases. Plaintiffs' expert Dr. Hilborn opined:

> Life cycle modeling for salmonids is widely recognized as an available and necessary scientific tool, and is generally accepted in the scientific community as the best method for identifying the factors affecting fish population abundance and determining the significance or relative importance of distinct factors causing salmonid fish population increases or decreases.

Hilborn Decl., Doc. 443 at ¶ 5. The BiOp concedes that "[i]deally, a life cycle approach, in which the effects on individual life stages on the life cycle could be estimated independent of the effects on other stages, would be implemented to assess the relative impacts on abundance...." BiOp at 66.

However, such models only qualify as "best available science"

where an appropriate model is available.[10] In the *Consolidated Delta Smelt Cases*, an appropriate smelt population dynamics was not available at the time the biological opinion in dispute in that case was issued:

> The ESA does not require FWS[] to generate new studies. In *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.*

[10] Plaintiffs also point to several documents in the administrative record where scientific experts recommended that NMFS use a quantitative life cycle model. *See, e.g.*, AR 00108170 (CALFED Science Panel commissioned by NMFS to review a draft version of the BiOp noted that the "lack of quantitative modeling ... and lack of integrative life-cycle modeling for salmon" was "[o]ne of the most important limitations to the analyses used in the draft [BiOp]"). However, these recommendations are not dispositive of whether the models discussed were "available."

> 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.

San Luis v. Salazar, 760 F. Supp. 2d at 884-85.

The 2010 PI Decision in this case found that Plaintiffs' were not likely to succeed on the merits of their life cycle modeling claim because they had not "present[ed] evidence that they, or anyone else[,] developed or made available to NMFS an appropriate life cycle model or the results of an appropriate life cycle analysis prior to the issuance of the BiOp." *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1132. However, the PI Decision is not law of the case. *S. Or. Barter Fair v. Jackson County, Or.*, 372 F.3d 1128, 1136 (9th Cir. 2004) ("[D]ecisions on preliminary injunctions are just that-preliminary-and must often be made hastily and on less than a full record.") (citing *Univ. of Tex. v. Camenisch*, 451 U.S. 390, 395 (1981)).

Plaintiffs insist that NMFS did have access to "several fully featured quantitative life-cycle models[,] which had been specifically designed for use in the Delta...." Doc. 431 at 15. Plaintiffs focus on the Interactive Object-Oriented Salmon simulation ("IOS") model,

developed by Bradley Cavallo, and the *Oncorhynchus* Bayesian Analysis ("OBAN") model, which was developed in coordination with NMFS. *Id.* at 19

a. IOS.

The BiOp discussed its decision not to use IOS, which was designed to evaluate the influence of different Central Valley water operations on the life cycle of winter-run using simulated historical flow and water temperature inputs." BiOp at 65.

> NMFS did not use the results of the IOS model for our analysis in this Opinion because the intended application of the model in the CVP/SWP operations BA was not useful for estimating, in an overall sense, how winter-run might respond to the proposed action. For example, the CVP/SWP operations BA cautions the use of the IOS model results in making inferences related to how winter-run abundance is affected by the proposed action: "*In evaluating effects of the proposed actions, differences between the three studies rather than absolute trends should be examined*" (Appendix O in CVP/SWP operations BA). Thus, it seems that the IOS model results presented in the CVP/SWP operations BA are not intended to reflect either abundance estimates observed in the past or future abundance with implementation of the proposed Project. Estimates based on observations are much different than estimates based on modeling without observation input. Results of the IOS model presented in the CVP/SWP operations BA show an increasing trend in winter-run escapement throughout the entire simulation period (i.e., from 1923 through 2002), such that by 2002, escapement is above 40,000 fish for all CALSIM II studies examined (figure 11-5 in CVP/SWP operations BA). Those results contrast with observed winter-run escapement estimates, which show a dramatic population crash during this period (see Grandtab at http://www.delta.dfg.ca.gov/afrp/), eventually leading to their endangered status under the ESA.
>
> In the Opinion, NMFS must consider how winter-run is expected to respond to implementation of the proposed action. Model results, such as the IOS model results presented in the CVP/SWP operations BA, that are not intended to at least generally approximate past or future

> conditions, do not inform us in this consideration. If the IOS model results in the CVP/SWP operations BA are intended to be used strictly as an alternatives comparison tool, as the CVP/SWP operations BA indicates, instead of one that produces somewhat meaningful trend information for individual model runs, then the utility of those results for the Opinion is limited, particularly considering that a model alternative representing just baseline conditions does not exist. The CALFED Peer Review Panel stated that, "*The default should be comparing the CALSIM studies of future scenarios (with different scenarios for climate change) to baseline*"(Anderson *et al.* 2009). The context of this statement was that comparisons among alternatives such as those used in the IOS model (e.g., CALSIM studies 6, 7, and 8) are inconsistent with the Opinion's analytical approach. As such, NMFS did not use the IOS model results presented in the CVP/SWP operations BA as evidence for analyzing how winter-run will be affected by the proposed action.
>
> Another consideration for not using the IOS model in the Opinion is that the model has not yet been published in peer reviewed scientific literature, and NMFS does not understand either the model's limitations or its extent. As described in Paine *et al.* (2000), mathematical models intended to help guide management of natural populations must be used wisely and with understanding of limitations. One potential limitation associated with applying large scale models over the entire life cycle of a species, as is done in the IOS model, is whether enough data are available to reliably estimate model parameters. Paine *et al.* (2000) state: "*When the data are not available for the needed estimates of parameter values, there is a tendency to insert values based on opinion or expert testimony. This practice is dangerous. The idea that opinion and "expert testimony" might substitute for rigorous scientific methodology is anathema to a serious modeler and clearly represents a dangerous trend.*" With these considerations in mind, NMFS did not utilize the IOS model in this Opinion.

Id. at 65-65 (italics in original). It is ironic that NMFS's reverence for "rigorous scientific methodology" is honored in the breach by the agency's failure to utilize the most rigorous method possible in the disputed BiOp.

Garwin Yip, supervisor for the Water Operations and Delta

Consultations branch of NMFS's Sacramento Area Office, elaborated on the first explanation provided in the BiOp -- that IOS estimates did not match actual historic winter run population levels -- by pointing out that even Plaintiffs' expert Dr. Burnham stated that: "If the data does generally not match the model, then we know that our assumption is somehow incorrect and needs refinement." Yip Decl., Doc. 481 at ¶ 9 (citing Burnham Decl., Doc. 439, at ¶ 24). Mr. Yip points out that "[h]ad NMFS based our conclusion for winter-run on the quantitative approach of the IOS life cycle model results contained in the BA, we would have erroneously concluded that the proposed CVP/SWP operations would help a great deal in recovering the species, rather than jeopardizing it." *Id.* at ¶ 10.

Second, Mr. Yip points out that the CalFed Science Panel, in its review of the December 11, 2008, draft BiOp, discussed NMFS's decision not to use IOS in the BiOp and acknowledged that "the IOS model is relatively new and has not been extensively vetted and published, but all of these types of models are flexible and the Panel wonders if, with sufficient time and with some adjustments and modifications, whether a new version of the IOS could be used." *Id.* at ¶ 11 (citing AR[11] 00108178 (Anderson, *et al.* 2009)). The CalFed Science Panel did not recommend or encourage the use of IOS in its current state at the time the BiOp was being developed.

Mr. Yip points out that the NMFS Central Valley Office requested

[11] All references to the NMFS administrative record are noted as "AR" references. References to the separate Reclamation administrative record will be noted as "USBR AR."

that NMFS's Southwest Fisheries Science Center ("NMFS-SWFSC") review various models, including IOS, for overall assumptions and limitations. According to Yip, NMFS-SWFSC "did not have the considerable staff resources and time it would take to adequately review and comment on the IOS model, it did have previous experience with similar models developed by Cramer Fish Sciences, and therefore, offered some comments." *Id.* at ¶ 12.

> To adequately review such a model [IOS model] one must thoroughly examine the model's foundation, functional relationships, error structure, and parameter values in order to assess the quality of the model's resulting inferences. The range of elements incorporated in similar models developed by this contractor [Cramer Fish Sciences] is extensive, many of which are hypothetical in nature and remain the focus of active research. For those model elements that are well-founded, many of the parameter values will, given the data poor situation we find ourselves in, have been set using data from other populations, locations, species, or simply by assumption. Adequate review of the appropriateness of the assumed functional relationship and parameter values would require a significant amount of time.... Parenthetically, we note that the use of large and complex models in data-poor situations runs directly counter to the advice given to NMFS by expert scientific review panels concerned with salmon recovery.

AR 00101045-6 (emphasis added).

NMFS contends that the IOS model was not available in a reliable, appropriate, and usable form at the time the BiOp was developed, and denies that IOS could have been adapted in a reasonable amount of time for use in the BiOp. NMFS knows all experts agree a life cycle model is the best methodology for measuring population effects. The agency continues to dodge serious questions the parties are entitled to have answered by refusing employ existing models. At the same time, NMFS

continues to plead poverty by describing this case as a "data-poor situation." If the data is so sparse that a workable model cannot be formulated, when does NMFS's failure to ensure appropriate data collection is taking place constitute bad faith? After more than five years of dispute, future pleas of data poverty will no longer be accepted.

As to the IOS model, although it is a close call, Federal Defendants' contention that IOS was not available in a reliable form at the time the BiOp issued has not been rebutted. Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing to apply IOS in the BiOp is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. OBAN.

Plaintiffs further argue that NMFS acted unlawfully by failing to apply the OBAN model in the BiOp. The BiOp mentions OBAN, but does not specifically address it, opting instead to generally explain that because existing life-cycle models only address population abundance, leaving out other aspects of the Viable Salmonid Population ("VSP") framework (e.g., spatial structure and genetic and life history diversity), the BiOp's analysis is superior because it encompasses these other factors:

> An alternative approach recommended by the CALFED Science Review Panel for estimating an ASR for the Central Valley includes the use of computer models. In particular, the IOS model (Cavallo *et al.* 2008) and the Oncorhynchus Bayesian Analysis (OBAN) model (Hendrix 2008) were referenced as potentially useful tools. IOS is a detailed mechanistic

model that describes the entire life cycle of both winter-run and spring-run in the Sacramento River, while the OBAN model is a Bayesian statistical model for winter-run in the Sacramento River. Although the CALFED Science Review Panel identified these models as potentially viable options either in combination or independently, it acknowledged the necessary refinement and implementation of this type of model by NMFS for the Opinion may not have been practical because of time constraints and the need for additional modeling expertise. Further development of mortality rates at different life stages specific to the Central Valley could be incorporated into the model to reduce the amount of assumptions currently required, and lead to more realistic and informative results. However, as previously mentioned, this type of information will not be available in the near term. Moreover, in order to sufficiently address the issue of fish routing through the Delta, identified as a critical component by the CALFED Science Review Panel, additional data collection and modeling over the long term (i.e., beyond the timeline allowed for the development of this Opinion) would be required.

As discussed above, this Opinion equates a listed species' probability or risk of extinction with the likelihood of both the survival and recovery of the species, and uses "likelihood of viability" as a standard to bridge between the VSP framework (McElhany *et al.* 2000) and the jeopardy standard. Assessing the viability of salmonid populations requires the consideration of other parameters in addition to population abundance, including productivity (*i.e.*, population growth rate), spatial structure, and genetic and life-history diversity (McElhany *et al.* 2000). All four VSP parameters are deemed important in evaluating a population's ability to persist, especially when faced with catastrophic disturbances (Lindley *et al.* 2007). Although the life cycle modeling approaches discussed above have the potential to provide information on all VSP parameters at some point in the future, it would require substantial data collection and model refinement. Any present attempt to complete such an exercise would only address one of those parameters (*i.e.*, abundance), and any results would include making many assumptions. Therefore, although a method for evaluating impacts during a specific life stage in terms of the overall loss in numbers of fish would be useful, there are other potential consequences resulting from project operations that need to be considered. For example, are mortalities at different life stages, or the loss of historical habitats, likely to have effects on the other VSP parameters? The analyses within this Opinion, in an attempt to encompass this broader range of effects, focused on

> determining whether or not appreciable reductions were expected from the proposed action, rather than trying to quantify the absolute magnitude of those reductions.

Id. at 67-68.

NMFS staff from the Seattle office collaborated with Dr. Nobel Hendrix, the author of the OBAN model, during the model's development. AR 00050578. Throughout 2008, NMFS communicated with Dr. Hendrix about the model, AR 00023869-70, and NMFS staff scheduled and attended meetings about the model, *see, e.g.,* AR 00050874. NMFS requested that its own Science Center review the OBAN model. AR 00046767-69.

Plaintiffs argue that Dr. Brian Wells, an NMFS fisheries biologist, described the OBAN model as "a great approach," AR 00050825, "a superior model design" and "well thought out," a model that "is the best approach laid out yet and deserves full attention," AR 00103798. Plaintiffs selectively quote Dr. Wells. For example, in a November 13, 2008 letter to Bruce Oppenheim, a NMFS biologist working on the BiOp, Dr. Wells did compliment the OBAN model:

> Statistically, this is a superior model design because it integrates each life-history phase transition appropriately through a string of Beverton-Holt recruitment models [citations]. The approach is well thought out and, with appropriate data, could result in an intriguing model that will allow the user to determine the potential impact of management decisions at any given life-history stage on the ultimate production of the stock...

AR 000103798. However, his next paragraph raises a concern about the available data set:

> The only criticism I have for this approach is in the capacity of the dat[a] to address these questions. At each stage the data is compromised. For instance, Chipp's Island

> data does not allow for stock-specific allocation of production and ocean data is reliant on notoriously poor effort data which is not stock specific. Such data will undoubtedly reduce the precision of these models to predict the effects of variability at each life-history phase on the cohort and it is possible that the process error could become cumulatively greater as additional life stages are strung together. Having said that, this is the best approach laid out yet and deserves full attention. The author is clearly aware of the data limitations and through his approach has done the best to accommodate.

Id.

The model's own developer agreed with the Science Center's concern that OBAN contains "a lot of factors that are hypothesized to affect winter run relative to the amount of data," and suggested that a "goal of the modeling effort is to identify some of the most important places to collect additional data." AR 00054082 (emphasis added). As of February 2009, NMFS still had not received a clear response about whether appropriate and sufficient data were available to reliably model population dynamics using OBAN. AR 00070672 (indicating it "is uncertain as to whether appropriate and sufficient data are available to reliably model the population dynamics of winter-run Chinook salmon and spring-run Chinook salmon. If appropriate data are not available, application of the OBAN and IOS models to inform risk analysis may lead to erroneous management decisions. Before utilizing the OBAN or IOS models, it is necessary for PRD to gain further confidence in the various results each model can produce.").

Plaintiffs also do not address the 2010 PI Decision's finding

that the application of population or life cycle models is not feasible for any analyses applicable to the CV steelhead, for which no population indices are available. *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1164.

Federal Defendants also remonstrate that even if sufficient data had been available, email communications in late 2008 and early 2009, while the BiOp was being prepared, describe the model as still under development. *See* AR 00060571 (January 21, 2009 email discussing need to develop temperature metrics). The software needed to run the model was not available until late April 2009. AR 00086362 (April 20, 2009 workshop demonstrating new software for OBAN model).

Plaintiffs rejoin that "Defendants' principal criticism of the OBAN model ... that the data were incomplete ... suggests a fundamental misunderstanding of life-cycle modeling generally." Doc. 48 at 15. Plaintiffs characterize Defendants' position as based on an erroneous premise that a life cycle model can never be used unless and until it is fully and finally perfected, peer reviewed, and populated with perfect data." *Id*. Plaintiffs complain that this is an impossible standard that ignores the reality that perfect data does not exist and that modeling is an iterative process. For example, Dr. Hilborn opines that life cycle models are "always evolving and many times being challenged by models that make alternative assumptions." Hilborn Reply Decl., Doc. 496 at ¶ 26.

> The standard scientific approach is a process of confronting competing models with data, not having a perfect and

> unchanging model. To suggest that a model is unavailable for use because it will require some adjustment or refinement ignores this reality.

Id. Dr. Hilborn pointed out that preliminary results from OBAN indicated that water temperature and harvest were the dominant factors affecting salmonid populations and that water exports was "not one of the most powerful explanatory factors." *Id.* at ¶ 25.

The record reflects that NMFS was working in late 2008 to integrate OBAN into the consultation process, *see* AR 00060572-73; AR 00052306-07, but that the agency elected not to make use of the model in the final BiOp approximately three months months before the BiOp was issued, AR 0065191-94. Plaintiffs assert that this was unreasonable because OBAN was "fully functional and ready to be integrated into the BiOp." Doc. 487 at 16. Agency experts concluded that there was not enough data to reliably apply OBAN.[12]

This is more disassembling by NMFS. Having not devoted necessary attention to OBAN, it rationalizes its doubts about the reliability of

[12] NMFS also claims it did not have the expertise to make use of such a model. Plaintiffs rejoin that any lack of modeling resources was manufactured by NMFS, "which could easily have made modeling resources available to the BiOp team," pointing to various individuals within NMFS who could have done the work. Doc. 487 at 17-18. This debate raises difficult issues. On the one hand, an agency cannot be permitted to ignore the best available science simply because it refuses to assign to the task personnel with the expertise to understand and apply that science. On the other hand, NMFS has limited resources, and a court cannot instruct an agency how to allocate those assets. While it may be reasonable to demand that NMFS assign to the BiOp team individuals who can correctly apply readily available statistical methodologies, at some point Plaintiffs' demands that NMFS assign specific experts on its staff to fine tune the application of OBAN to the purposes of the BiOp becomes a demand that NMFS develop new science. Where the line between these two extremes should be drawn is not clear. It is relevant that no outside expert (government, academic, or consultant) had applied OBAN in the manner Plaintiffs demand prior to the issuance of the BiOp. Plaintiffs were free to submit their own studies and results for NMFS's consideration. They did not.

application of OBAN in the BiOp as not clearly erroneous. NMFS remains in the position where it can raise doubt about all conflicting science and hide behind the rubric it cannot be compelled to collect data or develop a model. Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing to apply the OBAN model in the BiOp is DENIED and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED, but this is the last time NMFS will be permitted to avoid studying, analyzing, and applying a life cycle model. NMFS's chronic failure to do so now approaches bad faith in view of the undeniable importance of the information to resolve the perennial dispute over population dynamics. At some point, this diminishes the agency's credibility.

c. Ricker and/or Beverton-Holt Models.

Plaintiffs argue that, even if use of the IOS and/or OBAN models was not legally required, NMFS violated the ESA because it did not make use of certain "basic tools of fisheries management," such as the Ricker or Beverton-Holt models, two mathematical models developed in the mid-1900s. *See* Doc. 431 at 26. According to Plaintiffs' expert Dr. Burnham, these models make use of "simple mathematical expressions, based solely on past observations [that] combine all life history and environmental information into the period between parent spawners and the resultant returning spawners in the next generation." Burnham Decl., Doc. 439 at ¶ 18. According to another of Plaintiffs' experts, Dr. Ray Hilborn, these models are part of a "standard set of

population dynamics models ... that form the core of the body of knowledge" among fisheries biologists. Hilborn Reply Decl., Doc. 493 at ¶ 6. Dr. Hilborn concludes:

> NMFS should have at the very minimum used simple multiple regression with Ricker or Beverton-Holt models (as discussed in the declaration submitted by Dr. Richard B. Deriso (Doc. 440-0)) to see if exports or OMR flows and other factors such as ocean harvest rates, ocean upwelling, and (for winter Chinook) water temperatures on the spawning grounds were related to the cohort replacement rates. Such an analysis can be done in a matter of hours, and NMFS has dozens of scientists at the Science Centers who could have done this analysis. I find no explanation in the BiOp or the administrative record why such an analysis was not performed. It is 1940s science, is available, and could have and should have been performed at the very outset of the BiOp.

Id. at ¶ 30.

NMFS's biologist Garwin Yip submitted a detailed response:

> 23. Dr. Hilborn suggests that NMFS should have performed a statistical regression analysis to identify whether or not various environmental factors were related to, for example, the cohort replacement rate. Hilborn Reply Decl. ¶7, ¶30. While it's true that building a multiple regression model can be relatively simple and straightforward using available programs such as Excel, it is also true that many data are not suited for analysis with a straightforward multiple regression model. For example, Newman and Rice (2002, NMFS 127363-73) note that:
>
> > "The work of Kjelson *et al.* (1989) was closely scrutinized by numerous interested parties, and their methodology was criticized on a number of grounds. The assumptions and methods for estimating the indices, the application of standard linear regression to dependent variables ranging between 0 and 1, and the selection of covariates were major criticisms. In light of these criticisms, the interested parties chose to bring in statisticians previously unaffiliated with this work (namely, the authors) in an attempt to develop an alternative approach for modeling the release-recovery data. This article describes the resulting model. Although the approach here was quite different from that of Kjelson *et al.*, some of our conclusions were quite similar—for example, the sizeable effect of water temperature."

NMFS 127364. Indicative of the sophistication of the Newman and Rice (2002) analysis is the fact that it was published not in a fisheries or ecological journal, but rather in the Journal of the American Statistical Association.

24. Further warning of the potential pitfalls of using a "basic procedure" comes from p. 285 of Hilborn and Walters (1992), on the page immediately following the excerpt quoted by Dr. Hilborn, Hilborn Reply Decl. ¶7. After providing general equations for including multiple environmental terms in the Ricker and Beverton-Holt models, Hilborn and Walters (1992) ask "Why is this dangerous?" and proceed to say that "as tempting as it is to add environmental variables to stock-recruitment data, this is a potentially dangerous practice." On the same page, an explicit "warning" message reads "Be very, very cautious in fitting environmental variables, as it is almost impossible to make sure the apparent correlation is not spurious." (see Exhibit 1).

25. The devil is in the details, of course. I do not disagree with Dr. Hilborn's view that a basic regression analysis, possibly including an assessment of environmental terms in a standard stock-recruitment relationship, can be useful in many situations. However, in the specific case of evaluating the effects of CVP/SWP operations on cohort replacement rates of ESA-listed fish in California's Central Valley, I note that the "basic procedure" he suggests grows rather quickly either into a more complicated procedure, or into a "basic procedure" that relies on a set of assumptions that make interpretation and application of the analysis result more complicated. Consider, for example, a simple regression of cohort replacement rate (CRR) for winter-run Chinook salmon, against a single environmental factor. Below, I discuss several issues that would either complicate the analysis, or require simplifying assumptions: the interaction of age structure with the environmental variable of interest, and the selection of specific environmental measures.

26. First, how would the age structure of the spawning population in a given year be handled? One could, as did NMFS in the CRR summary provided in the status section for winter-run Chinook salmon (BiOp at 83), assume that the spawning population was composed entirely of three year olds. Using this assumption, the CRR is calculated as the spawning population at time t divided by the spawning population at t-3. While this assumption keeps the life-history model simple, it introduces an inaccuracy into the estimate of cohort replacement rate (unless one makes yet additional assumptions), since the 2- and 4-year olds in the spawning population at time t have actually been produced by spawners at time t-2 and t-4, respectively. The assessment of potential environmental influences on CRR can also be affected by this assumption of no age structure in the spawning population, depending on the environmental factor

being considered. For example, an assessment of attraction flows in year t (the year of return) as a factor affecting CRR would still be very appropriate, since all returning fish, regardless of age, would have experienced the flows observed in year t. In contrast, an assessment of OMR flows (or Sacramento River flow, or exports) during the juvenile outmigration period in year t-3 (the brood year) as a factor affecting CRR would be less appropriate, since the 2- and 4-year olds would not have experienced those OMR flows (or Sacramento River flow, or exports). Even if 3-year olds do make up the majority of spawners in a given year, 2- and 4-year old fish may well introduce sufficient mismatch into the model as to mask any environmental effect. Adjusting the model to allow appropriate matching of environmental factor with each age class of spawner leads down a yet more complicated analysis path.

27. Second, what measure would one use to assess "simple" effects like exports or OMR? Looking at row 16e of the stressor table for winter-run Chinook salmon (Table 9-1, BiOp at 452-460), one might choose to assess the impacts of OMR flows during the juvenile emigration period on CRR. Row 16e notes that OMR flows are a potential stressor in the Delta for juvenile winter-run Chinook salmon from November through May, so that's one possible averaging period, though clearly winter-run are more prevalent in the Delta in some months within that period than in others. Dr. Deriso, in his basic analysis of winter-run population growth rate against OMR flows, used the average OMR flow from December through March. Mechanistically, the impacts of OMR are likely to occur on the scale of days to weeks – it is not clear how to capture the effects of OMR variability at this temporal resolution in a model that (unless it is made more complex) calls for an environmental time series with a single value per year.

28. As described in the previous paragraph, a single, "simple" effect could be modeled in many ways. If one wants to consider additional effects (e.g., temperature during the spawning period, exports), each of which also can be modeled in various ways (and for factors such as temperatures, may have watershed-specific values), the possible list of environmental time series grows large very quickly. With this abundance of possible environmental effects, one needs to be very cautious about the risks of overfitting the model (which is an increasing risk as one includes more and more environmental factors into a single regression analysis) or the risks of increasing the Type 1 error rate by performing a large number of simple, single-factor comparisons. While there are various stepwise model-fitting procedures and multiple comparison procedures available to address these two issues, respectively, I note yet again that even the seemingly simple analysis proposed by Dr. Hilborn requires a not insignificant set of assumptions.

> 29. NMFS did perform some basic analyses in evaluating effects of the projects, (e.g. for estimating reasonable OMR targets to manage entrainment), and has been roundly criticized by other plaintiffs' experts (e.g., Dr. Burnham, Dr. Deriso) for the statistical imperfections of those analyses. On the whole, NMFS used a mix of quantitative and qualitative analyses, including analyses provided in the BA and selected scientific literature, in order to come up with its assessment of project effects and the suite of actions necessary to avoid jeopardy.

Third Yip Decl., Doc. 518. The application of these "simple" models is not as straightforward as Plaintiffs claim. The law relegates their use and application to the discretion of the agency unless clearly erroneous. Plaintiffs have not demonstrated that NMFS's use or non-use of these models is more than scientific dispute, which is resolved in favor of the agency. A court cannot lawfully second-guess the agency, unless clear scientific error or bad faith is so manifest that the agency's judgments can no longer be trusted. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to use the Ricker and Beverton-Holt models is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.[13]

d. Does the Absence of a Quantitative Analysis Render the BiOp's Quantitative Limits Per Se Unjustified?

Plaintiffs argue that even if the BiOp's failure to apply

[13] In their opening brief, Plaintiffs also argued that the conceptual model applied in the BiOp was biologically implausible because it relied on a particular study, Naiman & Turner (2000), for the proposition that it is possible to drive population to extinction by only slight changes in survival at each life history stage. Doc. 431 at 27-31. Plaintiffs complained that NMFS was misusing a "thought experiment" from that study as though it were scientific fact. *Id.* Federal Defendants respond that "NMFS did not rely upon the Naiman and Turner conceptual model to conclude that any one project effect causing small reductions in one life stage would jeopardize the species. The Naiman and Turner model was used in evaluating how slight incremental changes in life history stages affect already-diminished populations, as such changes are difficult to quantify and may take years to resolve." Doc. 477 at 28. Plaintiffs appear to have abandoned this argument.

quantitative life cycle modeling was not per se unlawful, the absence of such analyses "necessarily cripple[s] the specific quantitative limits imposed by the RPAs." Doc. 431 at 31. The Peer Review Panel addressed this issue:

> The preparation of the RPAs shifts the questions from jeopardy/no-jeopardy to questions like: Will proposed export and other modifications in the Delta provide the expected benefit for targeted species? Will water withdrawals through a new pumping facility at Red Bluff impose new mortality on downstream migrants that largely offsets the reduced mortality from lifting the dam gates at RBDD? Will remedial actions be effective or will they become expensive projects that show little improvement in species status? How will specific RPAs affect other listed species (e.g., delta smelt) and unlisted species (e.g., fall-run Chinook salmon)?
>
> Tier 1 comments, especially related to defining baseline and lack of quantitative integrative tools, become even more important in addressing these and similar RPA related questions. The long-term solution to this challenge is targeted research on the critical issues; careful monitoring of responses to implemented actions; and further development of models for generating baseline conditions, downscaling temporally and spatially coarse outputs, and simulating life cycle dynamics. The modeling and monitoring before and after implementation of actions is needed to highlight or test key uncertainties and to increase our understanding of the system in order to facilitate improved management in the future. We believe that lack of quantitative integrative tools will hinder the development of RPAs because NMFS cannot presently quantify the relative contributions of the different project effects to population status nor can NMFS quantitatively determine the potential benefits of specific remedial actions to population recovery. Without this information, it is difficult to rank the many possible remedial actions by their biological effectiveness relative to their fiscal and social costs in order to logically develop an optimal mix of actions.

AR 00089620-21 (emphasis added). Although the Peer Review certainly warned of the pitfalls of attempting to formulate RPA's without "quantitative integrative tools," it acknowledged that the "long-term

solution" was further development of modeling tools. The Peer Review did not outright advise the abandonment of quantitative RPAs in the short term. It did caution that the benefits cannot be quantified, nor can the fiscal and social costs.

For the purposes of this challenge to the BiOp and its RPAs, it is not appropriate or justified to find all the RPA Actions unlawful simply because Plaintiffs were not satisfied with the quantitative analyses performed in the BiOp. Each challenged RPA must be analyzed in light of the record evidence.

B. Baseline Analysis Challenges.

1. Failure to Distinguish Between Discretionary and Nondiscretionary Actions.

Plaintiffs opening brief advances an elaborate argument based on *National Association of Home Builders v. Defenders of Wildlife*, 551 U.S. 644 (2007), which held that the ESA's consultation requirement was not triggered when an agency undertook nondiscretionary actions, because the agency has no choice. Plaintiffs argue that NMFS erred by failing to distinguish between the discretionary and nondiscretionary aspects of CVP and SWP project operations. Doc. 431 at 48-55. Although it is undisputed that Reclamation operates the project to fulfill certain mandatory water delivery obligations, Plaintiffs' argument that *Home Builders* should be extended to require NMFS to segregate discretionary from non-discretionary operations, placing non-discretionary ones in the "baseline" for purposes of evaluating the action's effect on the Listed Species, was rejected in a December

14, 2010 Memorandum Decision issued in the related *Consolidated Delta Smelt Cases*:

> Plaintiffs complain that the BiOp's Project Effects analysis was "tainted" because it does not distinguish between discretionary and non-discretionary actions. [] *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.

San Luis v. Salazar, 760 F. Supp. 2d at 947-48. Any voluntary

efforts by NMFS to segregate discretionary from non-discretionary actions in the BiOp does not alter the fact that *Home Builders* imposes no legal obligation to do so.

Plaintiffs advance a related argument that even if *Home Builders* does not require segregation of discretionary from non-discretionary project operations in the BiOp, the ESA otherwise requires NMFS to consider only discretionary operations when evaluating the "effects of the action" vis-à-vis the environmental baseline. Doc. 431 at 55-58. This is based in part on the Science Panel's recommendation that NMFS model a baseline that represents a "hypothetical situation in which physical project infrastructure exists, but no project operations are performed except those mandated by prior agreements or those that are not part of the proposed actions." AR 00108175. The Panel offered:

> For example, the decline of stream habitat because the dams block gravel recruitment from upstream would be part of baseline, as would providing water to fulfill senior water rights agreements. Modeling in the Delta seemed to use recent conditions rather than an estimate of baseline conditions (i.e., recent conditions minus effects of project-related actions). This definition of baseline was described in words (although too succinctly, in the opinion of the Panel) in the draft BO but never quantified with model results. This can be a serious omission because without a proper baseline, one struggles to make straightforward comparisons of scenarios that differ only by whether proposed project operations are included or not. Much of the draft BO involves comparing results of various simulations, but we had difficulty interpreting results without direct comparisons of the correct baseline to the correct baseline with project operations.... NMFS must clearly define the baseline used in analyses and explain why this baseline was used rather than the baseline quoted above and seemingly required by the ESA.

Id. (emphasis added).

NMFS addressed this recommendation in the BiOp:

> **ESA regulations define the environmental baseline as "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" (50 CFR 402.02). The "effects of the action" include the direct and indirect effects of the proposed action and of interrelated or interdependent activities, "that will be added to the environmental baseline" (50 CFR 402.02). Implicit in both these definitions is a need to anticipate future effects, including the future component of the environmental baseline. Future effects of Federal projects that have undergone consultation and of contemporaneous State and private actions, as well as future changes due to natural processes, are part of the future baseline, to which effects of the proposed project are added.**
>
> **In consultations on continuing actions such as CVP/SWP operations, it is quite difficult to separate future baseline effects from the anticipated effects of the proposed action. Operations of existing structures, such as dams and gates, for water supply, flood control, and other purposes -- the proposed action -- are integrally related to the existence of the structures themselves, but effects of the mere existence of the structures are not effects of the proposed action. *See National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917, 930-31 (9th Cir. 2008). Similarly, some activities that are part of the proposed project are non-discretionary, and their effects are also not effects of the proposed action. *See id. at* 928-29 (citing *National Ass'n of Home Builders v. Defenders of Wildlife*, 551 U.S. 644 (2007)[)].**
>
> **Consequently, it is not surprising that in its review of NMFS' December 11, 2008, draft OCAP Opinion, the CALFED Science Review Panel (Anderson *et al.* 2009) commented that a clearly defined baseline was lacking. Reclamation (2009) provided similar comments. NMFS acknowledges that it was not easy to discern a uniform approach to characterizing the environmental baseline in the draft Opinion. NMFS believes, however, that this is due to the nature of the action under consultation and available information, rather than a flawed approach to the analysis. NMFS clarifies its approach here**

and in relevant sections of the Opinion.

In *National Wildlife Federation*, a case regarding consultation on the effects of operating hydropower dams on the Columbia River, the 9th Circuit Court of Appeals rejected NMFS' attempt to narrow the "effects of the action" by defining the baseline to include operations that NMFS deemed to be "nondiscretionary." The Court observed that many of the actions NMFS deemed "nondiscretionary" actually were subject to the action agencies' discretion, and it held that it was impermissible to create an imaginary "reference operation" excluding these actions, to which the effects of the action could be compared. Rather, the Court said that the regulatory requirement to consider the effects of the action added to the environmental baseline "simply requires NMFS to consider the effects of [the] actions 'within the context of other existing human activities that impact the listed species.' [citations omitted]" *Id.* at 930. In other words, the effects of a particular Federal action are intended to be evaluated not simply on their own, but as they affect the species in combination with other processes and activities.

The question addressed in a consultation is whether the project jeopardizes the species' continued existence. As the court stated in *National Wildlife Federation*, even if the baseline itself causes jeopardy to the species, only if the project causes additional harm can the project be found to jeopardize the species' continued existence. *Id.* This determination requires an evaluation of the project's effects, separate from the conditions that would exist if the project were not carried out.

NMFS and Reclamation together attempted to isolate the effects of proposed project operations by segregating the activities that are within Reclamation's discretion to change in the future from those that are not. This effort was not fruitful. The CVP/SWP operations BA begins with a summary of legal and statutory authorities, water rights, and other obligations relevant to the action (Chapter 1), all of which are incorporated into the project description (Chapter 2). Neither chapter describes what Reclamation's nondiscretionary operations would be if discretionary aspects of the proposed action were not implemented. In addition, in all of the models and simulations that Reclamation used to prepare the CVP/SWP operations BA, a "no project" scenario was not run. For example, table 2-1 in the CVP/SWP operations BA identifies the major proposed

> operational actions for consultation, including implementation of the water quality control plan (WQCP), but it is not clear whether implementing the WQCP, or some portion of it, is a non-discretionary action.
>
> Consequently, we determined that if NMFS were to propose a "no project operations" scenario to characterize the environmental baseline, it would be speculative and not supported by the model runs. Following the 9th Circuit's reasoning, with limited exceptions, NMFS assumed that all CVP and SWP operations are subject to the discretion of the project agencies and, thus, that all effects of future operations are effects of the proposed action. The only project effects considered to be within the future baseline (and thus not effects of the proposed action) are those caused by activities that are clearly outside the agencies' authority. For example, as in *National Wildlife Federation*, it is not within the agencies' discretion to remove dams, so the effects of their existence are part of the baseline. Figure 2-12 provides a conceptual diagram of how NMFS characterizes the past and future components of the environmental baseline for consultations on an ongoing action.

BiOp at 57-60.

NWF v. NMFS II, 524 F.3d 917, 929, applies to whether the BiOp's baseline rationale is reasonable for the proposed action. There, NMFS's 2004 biological opinion for the Federal Columbia River Power System ("FRCPS") "included in the environmental baseline for the proposed action the existing FCRPS, various supposedly nondiscretionary dam operations, and all past and present impacts from discretionary operations." *Id.* at 926. In addition, NMFS "adopted a novel 'reference operation' approach ... purportedly in order to account for the existence of the FCRPS dams." *Id.*

> The reference operation consisted of the dams and a hypothetical regime for operating them, which, according to NMFS, was the most beneficial to listed fishes of any possible operating regime. NMFS also found, though, that

> certain aspects of FCRPS operations-such as operations relating to irrigation, flood control, and power generation-were nondiscretionary, given the dams' existence, and that those aspects should not be considered part of the action under ESA review. The BiOp offers little detail on the nature and extent of the purportedly nondiscretionary obligations or NMFS's basis for finding them to be nondiscretionary.

Id. The Ninth Circuit evaluated this "reference operation" approach:

> The district court properly held that NMFS may not use a hypothetical "reference operation" in its jeopardy analysis to exclude from the proposed actions' impacts the effects of related operations NMFS deems "nondiscretionary." NMFS admits that it chose the reference operation approach in order to avoid "trying to precisely determine the extent of the Action Agencies' discretionary operation." However, neither the ESA nor *Home Builders* permits agencies to ignore potential jeopardy risks by labeling parts of an action nondiscretionary. We cannot approve NMFS's interpretation of this rule as excluding from the agency action under review discretionary agency actions taken pursuant to a broad congressional mandate.
>
> ***
>
> ...NMFS's contention that competing mandates for flood control, irrigation, and power production create any immutable obligations that fall outside of agency discretion is not persuasive. Indeed, NMFS's interpretation is neither mandated nor intimated by the Court's holding in *Home Builders*. The Court's concern in *Home Builders* was that "[a]n agency cannot simultaneously obey the differing mandates set forth in § 7(a)(2) of the ESA and § 402(b) of the CWA." 127 S.Ct. at 2534. In this context, compliance with the CWA provision is problematic because the provision "affirmatively mandates that [a specific action which conflicts with the ESA] 'shall' be [taken] if the specified criteria are met. The provision operates as a ceiling as well as a floor." *Id.* at 2533. Here, in contrast, Congress has imposed broad mandates which do not direct agencies to perform any specific nondiscretionary actions, but rather, are better characterized as directing the agencies to achieve particular goals.
>
> The 2004 BiOp itself recognizes that Congress has not quantified any of those broad goals, or otherwise specified

the manner in which the agencies must fulfill them. NMFS found, for instance, that Congress has mandated that dam operations include flood control, though "Congress has not prescribed precisely how the Corps must achieve its flood control responsibilities." 2004 BiOp at 5-5. Similarly, Congress has mandated that the BPA market and transmit "some level of power, although the precise level is not defined." *Id*. Thus, the 2004 BiOp recognizes that Congress has not specified the manner in which the agencies must fulfill their various obligations. In other words, while the goals themselves may be mandatory, the agencies retain considerable discretion in choosing what specific actions to take in order to implement them. The agencies are therefore obligated to satisfy the ESA's requirements. *See Pac. Coast Fed'n*, 426 F.3d at 1084-85 ("The ESA obligates federal agencies 'to afford first priority to the declared national policy of saving endangered species.' ") (quoting *TVA v. Hill*, 437 U.S. 153, 185 (1978)).[FN8]

> FN8. Moreover, at least some of the competing statutory mandates clearly acknowledge that implementing agencies must accommodate wildlife needs. *See* Northwest Power Act, 16 U.S.C. § 839 (providing for purposes of 1980 Pacific Northwest Electric Power Planning and Conservation Act "to be construed in a manner consistent with applicable environmental laws"); *ALCOA*, 175 F.3d at 1163 ("The Northwest Power Act's goal of providing economical power, however, does not supplant the BPS's obligation to comply with environmental mandates."); Confederated Tribes & Bands of the *Yakima Indian Nation v. FERC*, 746 F.2d 466, 473 (9th Cir.1984) (finding Northwest Power Act places "fish and wildlife concerns on an equal footing with power production").

NMFS may not avoid determining the limits of the action agencies' discretion by using a reference operation to sweep so-called "nondiscretionary" operations into the environmental baseline, thereby excluding them from the requisite ESA jeopardy analysis. And *Home Builders* cannot be read, as the State of Idaho would have us do, to immunize discretionary agency actions simply because they are taken in pursuit of a non-discretionary goal. The concern that an agency cannot "simultaneously obey" with both the ESA and the broad mandates relevant to this case is simply not at issue here.

ESA compliance is not optional. "[A]n agency cannot escape

> its obligation to comply with the ESA merely because it is bound to comply with another statute that has consistent, complementary objectives." *Washington Toxics Coal. v. EPA*, 413 F.3d 1024, 1032 (9th Cir. 2005). As the Court emphasized in *Home Builders*, "ESA's no-jeopardy mandate applies to every discretionary agency action-regardless of the expense or burden its application might impose." 127 S. Ct. at 2537. When an agency, acting in furtherance of a broad Congressional mandate, chooses a course of action which is not specifically mandated by Congress and which is not specifically necessitated by the broad mandate, that action is, by definition, discretionary and is thus subject to Section 7 consultation. Because NMFS's approach in the 2004 BiOp produces the opposite result, it is inconsistent with the ESA and its accompanying regulations, and cannot stand.

Id. at 928-29.

NWF v. NMFS found it inappropriate for NMFS to treat as "non-discretionary" activities undertaken to achieve "broad mandates which do not direct agencies to perform any specific nondiscretionary actions, but rather, are better characterized as directing the agencies to achieve particular goals." The opinion does not address the converse situation, present here, where it is alleged that NMFS included non-discretionary aspects of Project operations in the effects of the action, rather than in the environmental baseline.

Whether or not a particular aspect of project operations is "non-discretionary" is a complex legal inquiry that may take years of litigation to resolve. *See, e.g., Natural Resources Defense Council v. Kempthorne*, 627 F. Supp. 2d 1212 (E.D. Cal. 2009) (resolving lengthy cross motions for summary judgment on the issue of whether Sacramento River Settlement Contracts constituted non-discretionary water delivery obligation). Practically speaking, in all but the most

obvious of situations or for obligations that have previously been determined to be "mandatory," it is not feasible for the action agency to finely parse the legal determinations required to distinguish discretionary aspects of the action from non-discretionary ones in the preparation of a biological opinoin, especially in a system as complex as the joint Project operations. This is reflected in the 2009 Salmonid BiOp's explanation that NMFS could not reliably propose a "no project operations" scenario to characterize the environmental baseline.

Plaintiffs' ultimate argument is that if non-discretionary project operations are backed out of the "effects of the action" and instead are included in the "baseline" the effects of the action will no longer be "appreciable." This identical argument was explicitly rejected by ***NWF v. NMFS II's*** holding that comparison of the effects of the action against a hypothetical "reference operation" is not appropriate because the jeopardy analysis must focus on "whether the action['s] effects, when added to the underlying baseline conditions, would tip the species into jeopardy." 524 F.3d at 930. The Ninth Circuit reasoned:

> 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 CFR § 402.02; 16 U.S.C. § 1536(a)(2). NMFS argues that, under this definition, it may satisfy the ESA by comparing the effects of proposed FCRPS operations on listed species to the risk posed by baseline conditions. Only if those effects are "appreciably" worse than baseline

conditions must a full jeopardy analysis be made. Under this approach, a listed species could be gradually destroyed, so long as each step on the path to destruction is sufficiently modest. This type of slow slide into oblivion is one of the very ills the ESA seeks to prevent.

Requiring NMFS to consider the proposed FCRPS operations in their actual context does not, as NMFS argues, effectively expand the "agency action" at issue to include all independent or baseline harms to listed species. Nor does it have the effect of preventing any federal action once background conditions place a species in jeopardy. To "jeopardize"-the action ESA prohibits-means to "expose to loss or injury" or to "imperil." Either of these implies causation, and thus some new risk of harm. Likewise, the suffix "-ize" in "jeopardize" indicates some active change of status: an agency may not "cause [a species] to be or to become" in a state of jeopardy or "subject [a species] to" jeopardy. American Heritage Dictionary of the English Language (4th ed.). Agency action can only "jeopardize" a species' existence if that agency action causes some deterioration in the species' pre-action condition.

Even under the so-called aggregation approach NMFS challenges, then, an agency only "jeopardize[s]" a species if it causes some new jeopardy. An agency may still take action that removes a species from jeopardy entirely, or that lessens the degree of jeopardy. However, 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.

Our approach does not require NMFS to include the entire environmental baseline in the "agency action" subject to review.[FN9] It simply requires that NMFS appropriately consider the effects of its actions "within the context of other existing human activities that impact the listed species." ALCOA, 175 F.3d at 1162 n. 6 (citing 50 C.F.R. § 402.02's definition of the environmental baseline). This approach is consistent with our instruction (which NMFS does not challenge) 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." *Pac. Coast Fed'n*, 426 F.3d at 1093 (emphasis added).

> FN9. We note that under NMFS's jeopardy approach, the environmental baseline serves only as a point of reference to determine the net effects of a narrowly-defined action. Thus, whether an action is included in the baseline determines whether its impacts are considered at all in the agency's basic jeopardy analysis.
>
> The current existence of the FCRPS dams constitutes an "existing human activity" which is already endangering the fishes' survival and recovery. *See ALCOA*, 175 F.3d at 1162 n. 6 (citing 50 C.F.R. § 402.02). Although we acknowledge that the existence of the dams must be included in the environmental baseline, the operation of the dams is within the federal agencies' discretion under both the ESA and the Northwest Power Act, 16 U.S.C. § 839. Any proposed agency action must be evaluated in the contest of this baseline in order to properly determine whether the proposed actions will jeopardize the listed fishes.

Id. at 929-31 (emphasis added).

Nothing in the law requires NMFS to segregate discretionary aspects of coordinated Project operations from non-discretionary ones in the manner Export Plaintiffs demand. If feasible, it could have made sense for NMFS to do this to better document the relationship between the requirements of the species and the action agency's statutory authority to implement the RPA. But, NMFS disclaims the capacity to undertake appropriate modeling and related analysis. Export Plaintiffs have not demonstrated that NMFS's disclaimer is unreasonable.

Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to segregate discretionary aspects of Project operations from non-discretionary ones is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

2. Treatment of Available Data on Ocean Harvest and Ocean Conditions.

Plaintiffs next argue that NMFS acted unlawfully by failing to quantitatively analyze available data on ocean conditions and ocean harvest. Plaintiffs assert that these failures resulted in an "improper jeopardy finding and invalid RPA." Doc. 431 at 34.

a. Consideration of Ocean Conditions Data.

Plaintiffs argue that the BiOp should have used available data to quantitatively analyze the impact of ocean conditions on the Listed Species. Doc. 43 at 40-45. Specifically, Plaintiffs assert that NMFS should have performed quantitative analyses using data measuring the Pacific Decadal Oscillation ("PDO"), a recognized index of ocean conditions, so that the "major role ocean conditions play in determining abundance levels of salmonids ... could be compared with other stressors, such as the effects caused by water exports." Deriso Decl., Doc. 440 at ¶ 41. Record evidence suggests ocean conditions play a substantial role in salmon abundance. *See id.* (citing Hare & Mantua (1997), AR 00120076-84); *see also* AR 00084001 (Reclamation arguing to NMFS that "[o]cean conditions likely amount to 99.999% of the cause of the status of Central Valley species" and complaining that NMFS "isn't acknowledging this overwhelming stressor").

In a four and a half page section, the BiOp discusses the importance of natural environmental cycles, including those affecting ocean productivity:

4.2.4.11.1 Natural Environmental Cycles

Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare *et al.* 1999, Mantua and Hare 2002). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as the El Niño condition, appear to change productivity levels over large expanses of the Pacific Ocean. A further confounding effect is the fluctuation between drought and wet conditions in the basins of the American west. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years, which reduced inflows to watersheds up and down the west coast.

"El Niño" is an environmental condition often cited as a cause for the decline of West Coast salmonids (NMFS 1996b). El Niño is an unusual warming of the Pacific Ocean off South America and is caused by atmospheric changes in the tropical Pacific Ocean [El Niño Southern Oscillation (ENSO)] resulting in reductions or reversals of the normal trade wind circulation patterns. El Niño ocean conditions are characterized by anomalous warm sea surface temperatures and changes to coastal currents and upwelling patterns. Principal ecosystem alterations include decreased primary and secondary productivity in affected regions and changes in prey and predator species distributions. Cold-water species are displaced towards higher latitudes or move into deeper, cooler water, and their habitat niches are occupied by species tolerant of warmer water that move upwards from the lower latitudes with the warm water tongue.

A key factor affecting many West Coast stocks has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival in the ocean is driven largely by events occurring between ocean entry and recruitment to a sub-adult life stage.

The freshwater life history traits and habitat requirements of juvenile winter-run and fall-run are similar. Therefore, the unusual and poor ocean conditions that caused the

drastic decline in returning fall-run populations coast wide in 2007 (Varanasi and Bartoo 2008) are suspected to have also caused the observed decrease in the winter-run spawning population in 2007 (Oppenheim 2008). Lindley *et al.* (2009) reviewed the possible causes for the decline in Sacramento River fall-run in 2007 and 2008 for which reliable data were available. They concluded that a broad body of evidence suggested that anomalous conditions in the coastal ocean in 2005 and 2006 resulted in unusually poor survival of the 2004 and 2005 broods of fall-run. However, Lindley *et al.* (2009) recognize that the rapid and likely temporary deterioration in ocean conditions acted on top of a long-term, steady degradation of the freshwater and estuarine environment.

4.2.4.11.2 Ocean Productivity

The time at which juvenile salmonids enter the marine environment marks a critical period in their life history. Studies have shown the greatest rates of growth and energy accumulation for Chinook salmon occur during the first 1 to 3 months after they enter the ocean (Francis and Mantua 2003, MacFarlane *et al.* 2008)....Therefore, the conditions that juvenile salmonids encounter when they enter the ocean can play an important role in their early marine survival and eventual development into adults.

It is widely understood that variations in marine survival of salmon correspond with periods of cold and warm ocean conditions, with cold regimes being generally favorable for salmon survival and warm ones unfavorable....

***

The generally warmer ocean conditions in the California Current that began to prevail in late 2002 have resulted in coastal ocean temperatures remaining 1-2°C above normal through 2005. A review of the previously mentioned indicators for 2005 revealed that almost all ecosystem indices were characteristic of poor ocean conditions and reduced salmon survival....

Updated information provided by Peterson *et al.* (2006) on the NWFSC Climate Change and Ocean Productivity website shows the transition to colder ocean conditions, which began in 2007, has persisted throughout 2008. All ocean indicators point toward a highly favorable marine environment for those juvenile salmon that entered the ocean in 2008.... Therefore, ocean conditions in the broader California Current appear to have been favorable for salmon survival in

2007 and to a greater extent in 2008, which bodes well for Chinook salmon populations returning in 2009 and 2010. These ecosystem indicators can be used to provide an understanding of ocean conditions, and their relative impact on marine survival of juvenile salmon, throughout the broader, northern portion of the California Current. However, they may not provide an accurate assessment of the conditions observed on a more local scale off the California coast.

Wells *et al.* (2008a) developed a multivariate environmental index that can be used to assess ocean productivity on a finer scale for the central California region. This index (also referred to as the Wells Ocean Productivity Index) has also tracked the Northern Oscillation Index, which can be used to understand ocean conditions in the North Pacific Ocean in general. The divergence of these two indices in 2005 and 2006 provided evidence that ocean conditions were worse off the California coast than they were in the broader North Pacific region. The Wells *et al.* (2008a) index incorporates 13 oceanographic variables and indices and has correlated well with the productivity of zooplankton, juvenile shortbelly rockfish, and common murre production along the California coast (MacFarlane *et al.* 2008). In addition to its use as an indicator of ocean productivity in general, the index may also relate to salmon dynamics due to their heavy reliance on krill and rockfish as prey items during early and later life stages. For instance, not only did the extremely low index values in 2005 and 2006 correlate well with the extremely low productivity of salmon off the central California coast in those years, but the index also appears to have correlated well with maturation and mortality rates of adult salmon from 1990-2006 in that region (Wells and Mohr 2008). Although not all of the data are currently available to determine the Wells *et al.* (2008a) index values for 2007 and 2008, there is sufficient information to provide an indication of the likely ocean conditions for those 2 years, which can then be compared to 2005 and 2006.

A review of the available information suggests ocean conditions in 2007 and 2008 have improved substantially over those observed in 2005 and 2006. For instance, the spring transition, which marks the beginning of the upwelling season and typically occurs between March and June, was earlier in 2007 and 2008 compared to 2005 and 2006. An early spring transition is often indicative of greater productivity throughout the spring and summer seasons (Wells and Mohr 2008, Peterson *et al.* 2006). Coastal upwelling,

the process by which cool, nutrient rich waters are brought to the surface (perhaps the most important parameter with respect to plankton productivity), was also above average in 2007 and 2008. Moreover, coastal sea surface temperature and sea level height (representative of the strength of the California current and southern transport) values were also characteristic of improved ocean productivity (Wells and Mohr 2008). Thus, contrary to the poor ocean conditions observed in the spring of 2005 and 2006, the Wells *et al.* (2008a) index parameters available at this time indicate spring ocean conditions have been generally favorable for salmon survival off California in 2007 and 2008.

In contrast to the relatively "good" ocean conditions that occurred in the spring, the Wells *et al.* (2008a) index values for the summer of 2007 and 2008 were poor in general, and similar to those observed in 2005 and 2006. Summer sea surface temperature followed a similar pattern in both 2007 and 2008, starting out cool in June, and then rising to well above average in July before dropping back down to average in August (Wells and Mohr 2008). The strong upwelling values observed in the spring of 2007 and 2008 were not maintained throughout the summer, and instead dropped to either at or below those observed in 2005 and 2006. Finally, sea level height and spring curl values (a mathematical representation of the vertical component of wind shear which represents the rotation of the vector field), which are negatively correlated with ocean productivity, were both poor (Wells and Mohr 2008). Therefore, during the spring of 2007 and 2008, ocean conditions off California were indicative of a productive marine environment favorable for ocean salmon survival (and much improved over 2005 and 2006). However, those conditions did not persist throughout the year, as Wells *et al.* (2008a) index values observed in the summer of 2007 and 2008 were similar to those experienced in the summer of 2005 and 2006, 2 years marked by extremely low productivity of salmon off the central California coast.

Evidence exists that suggests early marine survival for juvenile salmon is a critical phase in their survival and development into adults. The correlation between various environmental indices that track ocean conditions and salmon productivity in the Pacific Ocean, both on a broad and local scale, provides an indication of the role they play in salmon survival in the ocean. Moreover, when discussing the potential extinctions of salmon populations, Francis and Mantua (2003) point out that climate patterns would not likely be the sole cause but could certainly increase the

> risk of extinction when combined with other factors, especially in ecosystems under stress from humans. Thus, the efforts to try and gain a greater understanding of the role ocean conditions play in salmon productivity will continue to provide valuable information that can be incorporated into the management of these species and should continue to be pursued. However, the highly variable nature of these environmental factors makes it very difficult, if not impossible, to accurately predict what they will be like in the future. Because the potential for poor ocean conditions exists in any given year, and there is no way for salmon managers to control these factors, any deleterious effects endured by salmonids in the freshwater environment can only exacerbate the problem of an inhospitable marine environment. Therefore, in order to ensure viable populations, it is important that any impacts that can be avoided prior to the period when salmonids enter the ocean must be carefully considered and reduced to the greatest extent possible.

BiOp at 149-53.

Plaintiffs do not argue that the BiOp entirely failed to consider ocean conditions and/or the PDO.[14] Rather, they argue that NMFS should have evaluated the impact ocean conditions have on salmon populations quantitatively, so that the effect of ocean conditions can be compared to the effects of project operations. In support of this argument, Plaintiffs quote the Peer Review: "[T]he possibility exists that we may be analyzing effects that occur within the system that ultimately are overshadowed by dynamics and effects in the marine phase." Doc. 487 at 36 (citing AR 0089603). Plaintiffs' quotation is

[14] The BiOp explains why the PDO is not necessarily the ideal measurement of ocean conditions off the California coast. While general ecosystem indicators, like the PDO, "can be used to provide an understanding of ocean conditions, and their relative impact on marine survival of juvenile salmon, throughout the broader, northern portion of the California Current... they may not provide an accurate assessment of the conditions observed on a more local scale off the California coast." BiOp at 151. Instead, the BiOp examined available data using the Wells index, which does provide specific information about conditions off the California coast. *Id.*

incomplete; the whole paragraph provides:

> The ocean phase remains a major knowledge gap for all of the species. Some information is available for salmon and adult green sturgeon, but little is known for steelhead and sub-adult green sturgeon. Growth and mortality after leaving the system can be affected by a variety of sources including climate patterns and effects on productivity and species community, harvest, trawl by catch, and predation by marine mammals and other predators. The draft BO does not directly address growth and survival during the ocean phase for any of the species. While we understand the logic, and time and knowledge limitations, the possibility exists that we may be analyzing effects that occur within the system that ultimately are overshadowed by dynamics and effects in the marine phase.

AR 0089603. Although the Peer Review expressly recognizes a need to consider "the dynamics and effects in the marine phase," as possibly significant to the species, this is not a pronouncement that standard scientific practice demands a quantitative analysis of ocean conditions. Plaintiffs cite no legal requirement that NMFS perform a quantitative analysis to determine the relative impact of ocean conditions on salmon populations. The ESA does not require such an analysis. The caselaw affirmatively decries such a relativistic approach. *See NWF v. NMFS II*, 524 F.3d at 930 ("even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm"). The relevant question is whether or not the record supports NMFS's conclusion that Project operations appreciably diminish those species' likelihood of survival and recovery in light of all pre-existing natural and manmade conditions. The appropriate focus, under *NWF v. NMFS II*, is not on the Projects' relative contribution to harm compared to ocean

conditions, but rather, whether Project operations cause separate harm, including by making the species more vulnerable to adverse ocean conditions.

The BiOp concludes that because the natural cycles that drive ocean conditions are "highly variable," it makes it "very difficult, if not impossible, to accurately predict what they will be like in the future," and because "the potential for poor ocean conditions exists in any given year, and there is no way for salmon managers to control these factors, any deleterious effects endured by salmonids in the freshwater environment can only exacerbate the problem of an inhospitable marine environment." BiOp at 152-53.

The BiOp cites Lindley (2009) for the proposition that deterioration in ocean conditions has "acted on top of a long-term, steady degradation of the freshwater and estuarine environment." *Id.* at 149 (citing Lindley (2009), AR 00123514-631). Plaintiffs are correct that Lindley (2009) found that ocean conditions and fishery management played roles in the low escapement of 2007. AR 00123517-18. Plaintiffs quote Lindley (2009)'s conclusion that "unfavorable ocean conditions were the proximate cause" of declines to the 2004 and 2005 broods. Doc. 487 at 38. Plaintiffs take these statements out of context. Before discussing impacts to salmon populations caused by human effects on the freshwater environment, Lindley (2009) emphasized the difference between "proximate" and "ultimate" causation:

> So far, we have restricted our analysis to the question of whether there were unusual conditions affecting Sacramento

> River fall-run Chinook from the 2004 and 2005 broods that could explain their poor performance, reaching the conclusion that unfavorable ocean conditions were the proximate cause. But what about the ultimate causes?

AR 00012355. The paper concluded that human manipulation of the freshwater environment likely "played a significant role in making this stock susceptible to collapse during periods of unfavorable ocean conditions." AR 00123551.

The law does not require a quantitative, comparative fault type analysis. If the species is in decline and one of the causes is Project operations, the agency has discretion to address and mitigate the resulting harm. The extent to which the record affirmatively demonstrates that Project operations cause separate harm is examined below in connection with Plaintiffs' challenges to the effects analysis.

Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing to quantitatively analyze ocean conditions is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. Consideration of Ocean Harvest Impacts.

Plaintiffs also argue that NMFS acted unlawfully by failing to quantify the effect of ocean harvest on the Listed Salmonids. Their argument is that: (1) NMFS has sufficient quantitative data to analyze the effects of ocean harvest on the Listed Salmonids because it manages the ocean harvest; (2) that data, if it had been quantitatively analyzed in the BiOp, would have revealed that the

losses caused by Project operations are miniscule in comparison to losses caused by ocean harvest. Doc. 431 at 37-40.

The ESA requires NMFS to evaluate to what extent the losses are caused by the proposed action, here the operation of the CVP and SWP. The action in question does not include ocean harvest, which in part is the result of separate government activity. NMFS quantitatively evaluated the impacts of ocean harvest on the Listed Species in a separate biological opinion. The Salmonid BiOp acknowledges that ocean harvest is a part of the environmental baseline affecting species viability, *see* BiOp at 144-46 (discussing ocean commercial and ocean and inland sport harvest as "factors responsible for the current status" of the Listed Species), but does not quantitatively integrate the impact of ocean harvest into the analysis of Project-related impacts on the species.

NMFS's obligation under the ESA is to evaluate how Project operations affect the Listed Species, in light of a depleted population impacted by ocean harvest and other conditions. It is inexplicable that these species are being managed in a piecemeal fashion, without considering all aspects of their life cycle in the same analysis, which would facilitate description of the true effect Project operations have on the species in light of other conditions. What population is available to be affected by Project operations is entirely relevant, as all Defendants have sought to attribute the species' decline to Project operations. Nonetheless, under ***NWF v.***

NMFS, the analytical focus is not on the relative contribution of the Projects to the species' condition, but whether the Projects cause additional, independent harm. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to quantitatively analyze ocean harvest impacts to determine whether, relatively speaking, they overwhelm Project impacts is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

C. Effects Analysis Challenges.

1. Use of a 100-Year Timeframe.

The BiOp evaluated how the proposed action would impact the species' risk of extinction over a 100-year time period. BiOp at 51. The BiOp explains that the jeopardy standard has been interpreted in the Joint Consultation Regulations as "a requirement that Federal agencies ensure that their actions are not likely to result in appreciable reductions in the likelihood of both the survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution." *Id.* at 42 (citing 50 C.F.R. § 402.02). This means:

> .... NMFS equates a listed species' probability (or risk) of extinction with the likelihood of both the survival and recovery of the species in the wild for purposes of conducting jeopardy analyses under section 7(a)(2) of the ESA. In the case of listed salmonids, we use the Viable Salmonid Populations (VSP) framework (McElhany *et al.* 2000) as a bridge to the jeopardy standard. A designation of "a high risk of extinction" or "low likelihood of becoming viable" indicates that the species faces significant risks from internal and external processes that can drive it to extinction. The status assessment considers and diagnoses both the internal and external processes affecting a

> species' extinction risk.

BiOp at 42. The VSP framework estimates the viability of salmonid populations by defining a viable salmonid population as one that "has a negligible probability of extinction over a 100-year time frame." *Id.* at 51. More specifically, the BiOp sets the threshold for jeopardy as the point at which the effects of the action, in the context of the baseline, result in a risk of extinction of greater than five percent over 100 years. The threshold combines two types of information: a probability of extinction expressed as the percentage likelihood of extinction and a timeframe within which that probability may come to pass, expressed in years. NMFS utilizes a NMFS technical memorandum by McElhany *et al.* (2000), AR 00124576, and a 2007 article by Lindley *et al.*, AR 00123475, as "a bridge to [this] jeopardy standard." BiOp at 42-43, 51-53.

The five percent probability of extinction component of the BiOp's standard is derived Lindley (2007), which opines: "We assume a 5% risk of extinction in 100 years is an acceptably low extinction risk for populations (Thompson, 1991)." AR 00123477 (emphasis added). Lindley (2007) describes specific criteria for assessing the risk of extinction, and "assume[s] that a 5% risk of extinction in 100 years is [] acceptably low...." AR 00123477. Lindley (2007) characterizes a risk of extinction of less than five percent within 100 years as "low," greater than five percent within 100 years as "moderate," and greater than 20% within 20 years as "high." AR 00123478.

The BiOp appears to derive the 100-year timeframe from McElhany (2000). *See* BiOp at 51. McElhany (2000) describes a viable salmonid population as "an independent population of any Pacific salmonid [ ] that has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame." AR 00124594. Regarding the selection of the 100-year time frame, McElhany (2000) states: "While it is ultimately an arbitrary decision, the 100-year time scale was chosen to represent a 'long' time horizon for evaluating extinction risk." Plaintiffs claim that neither the BiOp nor McElhany provide a reasoned basis for the decision to choose a time frame of 100 years, as opposed to any other, shorter, timeframe. When the McElhany (2000) sentence is read in context, an explanation is provided for the 100-year time scale emerges:

> While it is ultimately an arbitrary decision, the 100-year time scale was chosen to represent a "long" time horizon for evaluating extinction risk. It is necessary to evaluate extinction risk at a long time scale for several reasons. First, many recovery actions (such as habitat restoration) are likely to affect population status over the long term. Second, many genetic processes important to population function (such as the loss of genetic diversity or accumulation of deleterious mutations) occur over decades or centuries and current actions can affect these processes for a long time to come. Third, at least some environmental cycles occur over decadal (or longer) time scales (e.g., oceanic cycles—Beamish and Bouillon 1993, Mantua *et al.* 1997, Hare *et al.* 1999). Thus, in order to evaluate a population's status it is important to look far enough into the future to be able to accommodate large-scale environmental oscillations and trends.

AR 00124595. Plaintiffs identify no record evidence suggesting that this explanation is irrational.

Plaintiffs also argue that the 100-year timeframe is arbitrary in light of the fact that NMFS used a 24-year time frame just a year earlier in the biological opinion for the Federal Columbia River Power System ("FCRPS BiOp"). AR 00130923. The FCRPS BiOp addressed critiques suggesting that it use a 100-year extinction risk period as follows:

> Some suggested that NOAA Fisheries evaluate a 100-year extinction risk time horizon, rather than a 24-year period, or else set standards for both periods. The rationale was that the 24-year extinction risk is lower than the 100-year extinction risk (i.e., it "inflates" survival probability compared to the 100-year time horizon). It has been well-documented that extinction risk increases with longer time horizons, with the probability of extinction "approaching 100% for all species if the period is long enough" (NRC 1995). For example, Oregon's comments (page 5) include a Figure 2 that shows a low likelihood of extinction over 24 and 48 years and a high likelihood of extinction over 100 years for Upper John Day spring Chinook. This population is not listed under ESA, and is considered by the state of Oregon to be healthy (ODFW 2006a). While NOAA Fisheries is not familiar with the data or assessment methodology used in Oregon's 100-year extinction risk estimates for this population, their result suggests that even healthy salmon stocks may appear to have a high likelihood of extinction under this assumption. It has been equally well-documented that the precision of the risk estimate decreases with longer time horizons. For example, Fieberg and Ellner (2000) estimated that reliable estimates of extinction risk may only be possible when the number of base period observations is 5-10 times greater than the number of years in the time horizon.
>
> NOAA Fisheries continues to rely primarily on the 24-year time horizon for this analysis because the main purpose of the metric is to inform our judgment regarding the ability of the species to survive while actions to promote recovery are implemented under the Prospective Actions and through

> other processes. The 24-year period is more than twice that of most of the Prospective Actions and is identical to the short-term period considered in the 2000 FCRPS Biological Opinion (NMFS 2000b). However, NOAA Fisheries did calculate extinction risk over the 100-year time horizon to allow comparison of the 24-year extinction risk results with the 100-year extinction risk results of interest to some parties in the region. The 100-year extinction risk estimates and associated confidence intervals are reported in the Aggregate Analysis Appendix.

AR 00130937.

Plaintiffs maintain that these paragraphs from the FRCPS BiOp demonstrate that NMFS adopted a "prior practice" of using a 24-year extinction period and that NMFS failed to supply a reasoned basis for departing from that prior practice. *See River Runners for Wilderness v. Martin*, 593 F.3d 1064, 1075-76 (9th Cir. 2010) ("Part of the discretion granted to federal agencies is the freedom to change positions.... [A]n agency's view of what is in the public interest may change, either with or without a change in circumstances. But an agency changing its course must supply a reasoned analysis.") (internal citations and quotations omitted).

Plaintiffs suggest there is conflict between these two biological opinions. The FRCPS BiOp utilizes a 24-year timeframe to quantitatively evaluate short-term extinction risk where sufficient data was available to do so. AR 00131546. That was only possible for six of the 13 species covered by that biological opinion. NMFS did not have sufficient data to perform a 24-year analysis for the remaining seven species, so NMFS used a qualitative analysis of the VSP factors that considers a 100-year timeframe. *See* FCRPS BiOp,

Chapter 8.[15] Plaintiffs have not established that the 2009 Salmonid BiOp is a marked departure from prior and/or contemporaneous practice for the risk of extinction assessment. No evidence shows the shorter time span represents the best available science. This is another dispute that ends by default, with NMFS claiming the absence of data to permit it to engage in its preferred analysis. What has not been explained is whether or not a 100-year period introduces bias toward an extinction finding.

Based on limited precedent, the agency's partial justification, and the lack of any evidence demonstrating the agency's approach was irrational, the law defers to the agency. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing employing a 100-year timeframe is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

2. Winter-Run Viability Analysis.

Plaintiffs contend that the BiOp's determination that winter-run are at a "high risk of extinction" is not based on the best available science because that determination is an unexplained departure from a "nearly contemporaneous classification" to the contrary by Lindley (2007). AR 00123478. In addition, Lindley (2007) incorporates assessments of spatial distribution, as well as genetic and life history diversity. Plaintiffs maintain that Lindley classified the winter-run as "low risk" in 2007 and that the BiOp's reclassifying the

[15] The AR contains a portion of the FCRPS BiOp. The complete BiOp is available at http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/final-BOs.cfm.

species as being at "high risk" of extinction is unexplained. Doc. 431 at 64-66.

This argument is unconvincing for two reasons. First, Lindley (2007) did not unequivocally classify the winter-run as "low risk." Lindley (2007) assesses a population's viability by examining criteria relating to: (1) population size, (2) population growth rate, (3) the occurrence of catastrophic declines, and (4) the degree of hatchery influence. AR 000123478. In Table 1 of Lindley (2007) the thresholds for finding "high," "moderate," or "low" risk as to each of these four criteria are defined.

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Table 1. Criteria for assessing the level of risk of extinction for populations of Pacific salmonids. Overall risk is determined by the highest risk score for any category. (Modified from Allendorf et al. 1977)

	Risk of Extinction		
Criterion	High	Moderate	Low
Extinction risk from PVA	> 20% within 20 years	> 5% within 100 years	< 5% within 100 years
	– or any ONE of –	– or any ONE of –	– or ALL of –
Population size[a]	$N_e \leq 50$	$50 < N_e \leq 500$	$N_e > 500$
	–or–	–or–	–or–
	$N \leq 250$	$250 < N \leq 2500$	$N > 2500$
Population decline	Precipitous decline[b]	Chronic decline or depression[c]	No decline apparent or probable
Catastrophe, rate and effect[d]	Order of magnitude decline within one generation	Smaller but significant decline[e]	not apparent
Hatchery influence[f]	High	Moderate	Low

[a] Census size N can be used if direct estimates of effective size N_e are not available, assuming $N_e/N = 0.2$.
[b] Decline within last two generations to annual run size $\leq$ 500 spawners, or run size $>$ 500 but declining at $\geq$ 10% per year. Historically small but stable population not included.
[c] Run size has declined to $\leq$ 500, but now stable.
[d] Catastrophes occuring within the last 10 years.
[e] Decline $<$ 90% but biologically significant.
[f] See Figure 1 for assessing hatchery impacts.

AR 00123478.

Lindley (2007) concluded that, at the time the paper was published, winter run "easily satisfie[d] the low-risk criteria for population size, population decline, and catastrophe, but hatchery influence [was] a looming concern." AR 000123486. Lindley (2007) also factors in spatial distribution, as well as genetic and life-

history diversity as part of an overall assessment of viability. AR 00123481. Applying these additional criteria to winter-run, Lindley (2007) concluded:

> The Sacramento River winter-run Chinook salmon ESU does not currently satisfy the representation and redundancy rule because it has only one population, and that population spawns outside of the ecoregion where it evolved. For the Sacramento River winter-run Chinook salmon ESU to satisfy the representation and redundancy rule, at least two populations would need to be re-established in the basalt-and-porous-lava region. This may require passage past Shasta and Keswick dams.
>
> Obviously, an ESU represented by a single population at moderate risk of extinction is at high risk of extinction over the long run. A single catastrophe could extirpate the entire Sacramento River winter-run Chinook salmon ESU, if its effects persisted for four or more years. The entire stretch of the Sacramento River used by winter run Chinook salmon is within the zone of influence of Mt. Lassen. Some other possible catastrophes include a prolonged drought that depletes the cold water storage of Lake Shasta or some related failure to manage cold water storage, a spill of toxic materials with effects that persist for four years, or a disease outbreak.

AR 00123487.

Lindley (2007) advocated that an alternative assessment, population viability analysis ("PVA"), be applied where possible and that the results of the PVA be compared to the "simpler" criteria described in Lindley (2007). The authors opined that, at the time the paper was published, winter run were at a "moderate extinction risk" according to the PVA. AR 00123486.

Federal Defendants accurately described the Lindley (2007) findings and identified more recent information, including the 2007 population crash, that render Lindley (2007)'s specific conclusions

outdated. NMFS first focused on the catastrophe criteria:

> At the time of publication, Lindley *et al.* (2007) indicated that winter-run satisfies the low-risk criteria for population size, population decline, and catastrophe. However, they also acknowledged that the previous precipitous decline to a few hundred spawners per year in the early 1990s would have qualified it as high risk at that time, and the 1976-77 drought would have qualified as a high-risk catastrophe. In consideration of the almost 7-fold decrease in population in 2007, coupled with the dry water year type in 2007, followed by the critically dry water year type in 2008 (which could be qualified as a high-risk catastrophe) and likely a similar forecast for 2009, NMFS concludes that winter-run are at a high risk of extinction based on population size.

BiOp at 86.

Plaintiffs argue that the BiOp's conclusion that the almost seven-fold decrease in population in 2007, and resulting conclusion that winter run were at "high risk" of extinction based on population size is without support in the record, because, according to Lindley, even the 2007 population decline does not meet the "high risk" criteria (*see* Table 1 above). The population never fell to or below 500 spawners, nor did the 2007 decline meet or exceed the 90% "order of magnitude" decline definition. Cramer Decl., Doc. 448 at ¶¶ 42, 44.[16] Federal Defendants do not attempt to refute this criticism, and it appears that the record does not support a high risk finding in light of Lindley (2007)'s definition of a "high risk" designation

[16] Plaintiffs invoke Lindley (2009) to argue that the impacts to the species in the freshwater phase during recent years were inconsequential in comparison to the impacts resulting from poor ocean conditions. This argument fails for the reasons discussed above. Lindley recognized that the period of deteriorated ocean conditions, which were a major short-term cause of population decline, acted in conjunction with a long-term steady degradation of the freshwater environment leaving Chinook vulnerable to other stressors. *See* BiOp at 149; AR 00123517.

based on population.[17]

Plaintiffs also challenge this determination on the ground that Lindley (2000) defines a "catastrophe," as an event occurring within the last 10 years that caused "an order of magnitude decline within one generation," which "is created by a 90% decline in population size" over that generation. AR 00123478. Plaintiffs point out, and Federal Defendants do not dispute, that the 2007 population decline of 76% in one generation, while significant, did not meet this standard. Doc. 487 at 46. A 76% decline arguably meets the standard for "moderate" catastrophe, which is described as one that is "smaller" than a high-risk catastrophe, but "still [a] significant decline." NMFS's conclusion that the three subsequent years of drought caused a "high-risk" catastrophe is not supported by the record. It is at most a "moderate-risk" catastrophe.

Federal Defendants point out that in order for a population to be considered viable, it "must meet all the low-risk thresholds." Doc. 477-1 (citing BiOp at 84). Whether the drought was a "high" or "moderate" risk catastrophe or whether the population should actually have been classified as "low-risk" based on population size, does not change the fact that the winter-run are "not viable," because a

[17] Federal Defendants attempt to defend this analysis by asserting that the winter-run "population trend has been consistently negative for several decades." Doc. 477-1 at 50. Plaintiffs point out that Federal Defendants rely on a comparison of 2008 figures to 1969 figures to reach this conclusion. Doc. 487 at 47. Lindley (2007) states that "[p]opulation growth (or decline) [] is estimated from the slope of the natural logarithm of spawners versus time for the most recent 10 years of spawner count data." AR 00123481. In fact, when Lindley applied this standard to the most recent 10 years of data available at the time of publication, the population showed growth not decline. AR 00123486. Defendants do not explain this inconsistency.

classification of "moderate" is justified as to at least one criteria: catastrophe.

In addition, the BiOp found that winter-run are at a high-risk of extinction based on spatial structure. BiOp at 86-87. Although "spatial structure" was not one of Lindley (2007)'s primary criteria for population viability, it was considered. AR 00123481, 00123487. Lindley (2007) concluded that the winter-run "does not currently satisfy the representation and redundancy rule because it has only one population and that population spawns outside of the ecoregion where it evolved." AR 00123487. To satisfy this rule at least two populations would need to be re-established. *Id.* Plaintiffs emphasize that this situation is "entirely attributable to baseline conditions (i.e., dams)." Doc. 487 at 48. Lindley acknowledges this, noting that establishment of additional winter-run populations "may require passage past Shasta and Keswick dams." AR 00123487. But, this does not render spatial structure irrelevant to the BiOp's analysis. "[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." *NWF v. NMFS II,* 524 F.3d at 930.

Is there a practical implication in the BiOp of NMFS's unsupported description that the winter-run are at "high-risk," as opposed to the less serious classification of "not viable"?

Plaintiffs cite Steven Cramer's Reply Declaration to support their argument that the BiOp used the "high-risk" designation to "justify its failure to do a careful, scientific analysis of the RPA because immediate radical action supposedly is necessary." Doc. 487 at 44 (citing Cramer Reply Decl., Doc. 487 at ¶¶ "20-17[sic]"). Cramer opines:

> ...Although "high-risk" of extinction is not a necessary criteria for determination of jeopardy, NMFS uses the "high risk" rating that stems from its misapplication of Lindley *et al.* (2007) to indicate that immediate additional constraints on water operations are needed to avoid extinction. In other words, from its initial, scientifically incorrect premise, NMFS implies that substantial new restrictions are necessary because the population is supposedly at high risk of extinction, so any careful analysis of the RPAs is inconsequential compared to a claimed urgent need to take radical action. (*See* Fed. Def. Br. at 8-9.)

Id. at ¶ 20. Cramer's accusations are troubling, but are not reflected in the record. Mr. Cramer cites pages 8-9 of Federal Defendants' memorandum in support of their cross motion for summary judgment. Nowhere on those pages do Federal Defendants even mention the "high-risk" rating, let alone rely upon it to justify the RPAs in any way.

Plaintiffs have identified areas of NMFS's analysis that are completely unsupported by the record, constituting "clear error." The extent to which they undermine the viability determination is properly addressed on remand. This aspect of the BiOp must be remanded for correction.

3. Orca Analysis.

The BiOp concluded that the Southern Resident population was so diminished that "the loss of a single individual, or the decrease in reproductive capacity of a single individual, is likely to reduce the likelihood of survival and recovery of the DPS." BiOp at 573. The BiOp also concluded that any reduction in the Southern Resident's prey base may have adverse physiological effects on Southern Residents. *Id.*

Plaintiffs point to yet another separate biological opinion issued May 5, 2009, evaluating the effects of the Pacific Coast Salmon Plan, which governs management of commercial and recreational salmon fishing off the west coast of the United States, on the Southern Residents ("Orca Salmon Harvest BiOp"). *See* AR 00131721 – 802. According to Plaintiffs, the Orca Salmon Harvest BiOp "produced an extraordinarily detailed quantitative analysis of the effect of decreases in the adult [C]hinook population on Southern Residents ... that incorporated data on factors such as orca abundance, size, and kilocalorie requirements, which NMFS used to project the percent changes in prey availability at different locations in the orcas' range, different times of the year, and different levels of quality in yearly [C]hinook salmon production." Doc. 431 at 35. The Orca Salmon Harvest BiOp concluded that planned ocean harvest of salmon would not jeopardize the Southern Resident Killer Whales. AR 00131781.

The crux of Plaintiffs' complaint is that both the conclusions

reached and the methodologies used in the 2009 Salmonid BiOp are inconsistent with those of the earlier-issued, more comprehensive and focused Orca Salmon Harvest Biop. Plaintiffs argue:

> One would think that the Orca BiOp's analysis—which found that percent reductions in available chinook ranging up to 11.8% would not jeopardize the Southern Residents—would represent the best available science, and would provide extensive guidance to NMFS in its analysis of the effect of the projects' take of juvenile salmonids. And yet, NMFS relied instead on an earlier quantitative analysis, produced February 4, 2009, which it never updated or revised to reflect the new state of the agency's own science represented by the Orca BiOp. (BiOp, App. 3, AR 00107119-136.) The earlier study contained in Appendix 3 did not include any of the analysis of Southern Resident metabolic needs, location, or seasonal migration—all of which were described as "necessary" in the NMFS Orca BiOp study issued a full month before the final publication of the Salmonid BiOp. In fact, Appendix 3 of the BiOp does not even mention the Orca BiOp, despite its obvious relevance and its status as the best available science on the effect of the take of adult salmon on Southern Residents. This, on its own, was a failure to use the best available science in violation of the ESA.
>
> What Appendix 3 did instead was to quantitatively analyze the effect of the projects on adult salmon abundance under the various Reclamation Study scenarios. It compared these analyses with a scenario representing salmon production without the water projects ("No Project"), which it defined as the highest salmon production year on record. (BiOp, App. 3 at 1, AR 00107119.).... What does this study show? It shows that in the worst case scenario—which is a comparison of the best possible outcome and the worst possible outcome—the reduction in total number of adults would be 13.9% (see highlighted figures above).
>
> It is useful to look at this very worst case scenario in terms of numbers: the total projected population reduction caused by that 13.9% reduction is 120,945 adult salmon. To put that in perspective, that hypothetical worst case scenario is smaller than the actual reported total loss in the lowest ocean harvest on record (161,845 adult salmon). RJN, Ex. 2, Ocean Harvest BiOp at 31. Looking at the average projected reduction in Study 7.1 and Study 8.0 (the

> column labeled "Mean") compared with the "No Project" scenario, the result of the projects is a much more modest take of about 20,150 fish, which is eight times less than the lowest salmon ocean harvest ever recorded.

Doc. 431 at 35-36.

Federal Defendants maintain that the two biological opinions are not inconsistent because they address impacts over different time frames and from different actions. The Orca Salmon Harvest BiOp describes short-term impacts to prey availability in specific months during high abundance Chinook years. The 2009 Salmonid BiOp considered impacts to Southern Residents caused by long-term increase in the risk of extinction for winter-run and spring-run Chinook, in addition to long-term impacts to fall-run. BiOp at 573. The Orca Salmon Harvest BiOp concluded the long-term impact of ocean harvest is not likely to appreciably reduce the survival and recovery of the listed Chinook and other salmon affected by harvest, in part because the fishery is managed to adjust harvest levels annually according to the actual salmon population available for harvest, thereby avoiding harm to the species. AR 00131776-81. The 2009 Salmonid BiOp concluded that Project operations would increase the risk of extinction of winter-run and spring-run, which "increases the risk of a permanent reduction in prey available to Southern Residents, and increases the likelihood for local depletions of prey in particular locations and times." *Id.* at 574.

Although these biological opinions facially consider different time frames and different actions, it is undeniable that they are

temporally and factually interrelated. The Salmonid BiOp specifically concludes that Project operations will reduce the abundance of naturally produced CV fall run Chinook salmon, a source of prey to the Southern Residents. BiOp at 574. As a result, the Salmonid BiOp concludes "Southern Residents would likely experience nutritional, reproductive, or other health effects from reduced prey as a result of the proposed action." *Id*. In contrast, the Orca Salmon Harvest BiOp concludes that, even in the long run, implementation of the Pacific Coast Salmon Plan will not have long-term deleterious effects on Chinook salmon. AR 00131776-77. It is true that the Pacific Coast Salmon Plan is designed to manage commercial and recreational salmon harvest to meet salmon recovery goals and requires conservation measures, including suspension of all harvest if necessary, when Chinook stocks are doing poorly. AR 00131777. This amounts to a "do no harm" approach to managing the fishery. However, under such a management approach, it is plausible that any impact to fall-run Chinook, and any related impact to orca, caused by Project operations could be automatically mitigated by reduced harvest in the ocean. How these two sets of human actions (Project operations and harvest restrictions) interplay, and how this interplay might impact the likelihood that Project operations would harm the Southern Residents, is not discussed in the Salmonid BiOp, which post-dates the Orca Salmon Harvest BiOp, albeit by only one month. NMFS's own findings in the Orca Salmon Harvest BiOp are certainly "relevant factors" NMFS

should have taken into consideration before issuing the Salmonid BiOp. Federal Defendants, through counsel, provide a partial, but insufficient, post hoc explanation.

Plaintiffs' motion for summary judgment that the Orca jeopardy analysis is unlawful is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED. On remand, NMFS must explain how the findings of these two biological opinions can be reconciled.

4. Interior Delta Mortality as an Indirect Effect.

Plaintiffs assert that the BiOp unlawfully classifies mortality from predators, pollution, and other adverse conditions in the interior delta, as "indirect effects" caused by Project operations. Doc. 431 at 66-72.

a. Applicable Legal Standard.

The Joint Consultation Regulations promulgated by FWS and NMFS explain that "effects of the action" refers to "the direct and indirect effects of an action on the species or critical habitat... that will be added to the environmental baseline...." 50 C.F.R. § 402.02. "Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." *Id.* (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) (emphasis added). In the preamble of the Final

Rule adopting the ESA regulations, NMFS and 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 distinguished the ESA from NEPA and expressly explained the intent and rationale for adopting the more narrow "reasonably certain to occur" standard for indirect and cumulative effects under the 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); *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).

The December 14, 2010 summary judgment Decision in the *Consolidated Delta Smelt Cases* found that the "reasonably certain to occur" standard controlled the asserted causes of indirect mortality to the smelt in the interior Delta. *San Luis v. Salazar*, 760 F. Supp. At 146-47. Here, NMFS resists such a finding, arguing that Plaintiffs (and by implication the December 14, 2010 MSJ Decision in the *Consolidated Delta Smelt Cases*) confuse the BiOp's discussion of "indirect mortality" with the regulatory term "indirect effect." Doc. 477-1 at 55. Federal Defendants argue that the "reasonably certain to occur" standard does not refer to the certainty of the effect on the species, but rather to the certainty of whether a future activity (i.e. the activity that may have an effect on the species) will occur. The federal register notice promulgating the relevant regulations explains that NMFS considers "effects to listed species from such future activities that are reasonably certain to occur under the analysis of 'indirect effects.'" 51 Fed. Reg. 19,926, 19,932 (June 3, 1986)(emphasis added). Indirect effects are further defined as "those that are caused by the action and are later in time but are still reasonably certain to occur." *Id.* (emphasis added). Federal Defendants point out that the kinds of "indirect mortality" discussed in the BiOp are not "future activities." Rather, they are a category of effects that are purportedly occurring all the time.

Plaintiffs rejoin by citing a single sentence from the Final ESA Section 7 Consultation Handbook, jointly prepared by FWS and NMFS, which explains that "[i]ndirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration." AR 00217743 ("Consultation Handbook") at 4-29 (emphasis added).[18] Plaintiffs argue that the use of the word "include" suggests "that NMFS considers effects from future activities to be only a subset of possible indirect effects, and that indirect effects are not limited to future activities." Doc. 487 at 57. Plaintiffs do not mention the very next sentence of the Consultation Handbook. The entire paragraph reads:

> Indirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. In order to treat these actions as indirect effects in the biological opinion, they must be reasonably certain to occur, as evidenced by appropriations, work plans, permits issued, or budgeting; they follow a pattern of activity undertaken by the agency in the action area; or they are a logical extension of the proposed action.

Id. (emphasis added). Here, the indirect mortality findings challenged by Plaintiffs do not constitute "indirect effects." The indirect mortality discussed in the BiOp is caused by the action subject to consultation, not by some other action that is the subject of work plans, permits, or budgeting. The emphasized language specifies actions "reasonably certain to occur," not those that have occurred. This suggests but does not explicitly reference actions

[18] NMFS's and FWS's joint Consultation Handbook "provides internal guidance and establishes national policy for conducting consultation and conferences pursuant to Section 7 of the Endangered Species Act of 1973, as amended." AR 00217635.

other than the action under consultation.

The "reasonably certain to occur" standard does not apply to the indirect mortality analysis in the BiOp.[19] However, this does not immunize the indirect mortality findings from review. "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 in the wild but reducing the reproduction, numbers and distribution of that species." 50 C.F.R. § 402.02. The BiOp finds project operations cause indirect mortality. Whether such findings are reasonable must be addressed.[20]

a. Does the Record Support a Finding that Project Operations Can Reasonably Be Expected to Cause More Salmonids to Enter the Interior Delta?

Plaintiffs concede that the mortality rate of migrating salmonids is generally higher for fish traveling through the interior Delta than for fish that remain in the mainstem Sacramento River. Doc. 431 at

[19] This finding applies with equal force to the analysis of the causes of indirect mortality discussed in the *Consolidated Delta Smelt Cases'* December 14, 2010 Summary Judgment Decision, namely the negative influence of Project operations on delta smelt food supply and the exacerbation of the impacts of pollution and contaminants by Project operations. Although the reasonably certain to occur standard was applied in that case, the link between Project operations and these purported sources of indirect mortality were not clearly articulated in the BiOp or justified by record evidence, so the application of the incorrect standard did not make a material difference.

[20] Plaintiffs also argue that NMFS must affirmatively acknowledge its own regulatory standard in the BiOp, presumably by making direct reference to the relevant regulatory language. Doc. 431 at 67. Although a court "cannot infer an agency's reasoning from mere silence," *PCFFA v. U.S. Bureau of Reclamation*, 426 F.3d 1082, 1091 (9th Cir. 2005), so long as the record, as evidenced by the agency's reasoning in the BiOp, supports a finding that Project operations reasonably would be expected to cause indirect mortality, the ESA does not require NMFS to use "magic words" in a biological opinion. An agency's rationale must be upheld if it can "reasonably be discerned." *See Modesto Irr. Dist. v. Gutierrez*, 619 F.3d 1024, 1035 (9th Cir. 2010).

68. Plaintiffs argue, however, that the record does not support the BiOp's conclusion that project operations cause more salmonids to take the more dangerous routes through the interior Delta. *Id.* at 67-70. Plaintiffs fault the BiOp for not providing any "analysis or articulation whatsoever of [what] additional fraction of emigrating salmonids -- above the baseline number that will enter the Delta irrespective of the projects -- will be induced to enter the interior Delta solely as a result of proposed project operations." Doc. 431 at 68. Plaintiffs incorporate by reference the arguments made by DWR in its challenge to Action IV.2.1. *Id.* at 69-70. As Plaintiffs' challenge turns on the merits of DWR's challenge, which is thoroughly discussed below in the context of Action IV.2.1, there is no need to separately discuss them here.

b. Does the Record Support a Finding that Project Operations Can Reasonably Be Expected to Cause Indirect Mortality from Exotic Species, Pollution, and/or Food Limitations in the Interior Delta?

Plaintiffs also contend that there is no record evidence to support the BiOp's implied conclusion that project operations cause indirect mortality from exotic species, pollution, and other adverse environmental conditions in the interior Delta. Doc. 431 at 70-71.

(1) Exotic Species.

Among other things, the BiOp concludes that Project operations create conditions that favor exotic over native species:

> In addition to the "direct" effects of the CVP and SWP operations manifested by flows and exports, the modification of the Delta hydraulics for the conveyance of water has

> altered the suitability of the Delta for native species of fish, such as Chinook salmon, steelhead, and green sturgeon. Since the inception of the CVP and later the SWP, the natural variability in the hydrology of the Delta has been altered. As previously explained, the amount and timing of runoff from the Sacramento and San Joaquin Rivers has been altered and shifted to accommodate human needs. When large-scale exports of water were initiated in the South Delta, it became necessary to "freshen up" the Delta to guarantee high quality fresh water was available to export from the facilities on a reliable basis (e.g., construction of the DCC). This necessitated an increase in the stability of the Delta's hydrology and the formation of a large freshwater "lake" for the reliable conveyance of water from the river sources to the export facilities. The enhanced stability of the freshwater pool in the Delta enabled non-native species, such as centrarchids and catfish, as well as invasive plants, such as *Egeria densa* and water hyacinth, to thrive in this "new" Delta hydrology (Brown and Michniuk 2007). In addition, the altered ecological characteristics of the Delta have been proposed as a contributing factor in the recent Pelagic Organism Decline (POD) observed in the Delta. The combination of these exotic species and altered ecological characteristics of the Delta interact to decrease the suitability of the Delta for native species of fish and have increased the potential for predation and loss (see 2008 CVP/SWP operations BA, Delta smelt sections for a more detailed explanation).

BiOp at 382 (emphasis added). Elsewhere, the BiOp concludes:

> As described earlier in the Delta effects analysis, many of the sources of loss associated with moving fish through the Delta, such as predator populations and the increased prevalence of non-native aquatic weeds such as *Egeria densa*, have their own interconnections with the operations of the CVP and SWP, and their continued presence is linked to maintaining an artificially stable Delta environment conducive to moving freshwater towards the pumps.

Id. at 433.

Plaintiffs do not directly contest the conclusion that the altered hydrologic conditions are favorable for invasive species. Nor do Plaintiffs challenge the BiOp's conclusion that CVP and SWP operations contribute to this ecosystem alteration. Rather, they argue that the operators of the CVP and SWP did not release the exotic

predators or introduce the exotic weeds, nor can the operators of the projects control these alien species. Doc. 431 at 71.

This is not disputed. The BiOp does not assert, as it cannot, that the Projects were the original cause of these problems. The BiOp concludes that the hydrologic conditions created by the projects favor the continued presence of these exotics and that proposed project operations are likely to make this situation worse. *See* BiOp at 382 ("Continued operations of the CVP and SWP are unlikely to benefit the health of the Delta, and increases of the facility operations are likely to degrade the system beyond their current conditions, rather than return the Delta to a more natural condition, with more functional hydraulics conducive to a healthy ecosystem."). The BiOp cites recent studies, including Brown and Michniuk (2007), *see* BiOp at 382, to support its conclusion that this "new" Delta hydrology favors exotic species over native ones. Plaintiffs do not challenge the BiOp's reliance on these studies.

However, assuming the BiOp properly found a Project-exotics connection, NMFS failed to adequately consider this factor in its jeopardy analysis. What effect do these exotics have on the Listed Species? To what extent does the contribution of the Projects to the continued presence of these exotics contribute to the jeopardy finding? Could altered project operations reduce the presence of exotics? NMFS's logic taken to the extreme means the Projects cannot operate, as no analysis has been done to evaluate the impact on the

Listed Species from this indirect effect at varying pumping levels. It may be that there is insufficient information to answer these questions, but this is pure speculation, as the sufficiency of information is not discussed. This is another example of the need for a realistic analysis of relative effect from Project operations on conditions that are not related to pumping.

The BiOp's analysis of the influence of Project operations on the continued presence of exotic species, and how this relates to indirect mortality to the Listed Species, must be explained. Plaintiffs' motion for summary judgment on this issue is GRANTED. Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

(2) Pollution and Food Limitation.

Plaintiffs also argue that the BiOp unlawfully "blames the project for pollution and food limitation by labeling them effects of the action." Doc. 431 at 72. This is the logical inference drawn from the focus on predators and contaminants, which are mentioned throughout the BiOp. The agency does not explain how the projects influence contaminants or cause food limitations. Plaintiffs point to a statement in the biological assessment that "there is no direct evidence of food limitation for salmon in the delta or lower estuary," AR 00143672. It is not clear that the BiOp actually asserts that there is a food limitation in the lower estuary. This imprecision contributes to the inadequacy of the BiOp. There is no way to understand the BiOp's attribution of adverse indirect effects to the

Projects.

Plaintiffs' motion for summary judgment that the record does not support the BiOp's conclusions about the connection between Project operations and pollution and food limitation, causing indirect mortality to the Listed Species is GRANTED. Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

D. Critical Habitat Analysis.

1. There Is No Requirement that NMFS Identify a Numerical Threshold for Adverse Modification.

Destruction or adverse modification is defined by regulation to mean "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 demand that NMFS set a threshold for adverse modification and directly analyze whether the action "appreciably diminishes" the capability of habitat to support survival or recovery vis-à-vis this threshold. *Id.* at 75. This demand was rejected in the December 14, 2010 MSJ Decision in the *Consolidated Delta Smelt Cases*:

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.*

San Luis v. Salazar, 760 F. Supp. 2d at 945. NMFS is not required to set a numeric threshold for adverse modification.

2. Significance of Impacts to Critical Habitat.

Plaintiffs argue that the adverse modification findings are unlawful because the BiOp explicitly declines to apply the regulatory definition of adverse modification found in 50 C.F.R. 402.02. Doc. 431 at 75. The BiOp states:

> For critical habitat, NMFS did not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the analysis with respect to critical habitat. NMFS will evaluate "destruction or adverse modification" of critical habitat by determining if the action reduces the value of critical habitat for the conservation of the species.

BiOp at 43. Plaintiffs maintain that this reads the word "appreciably" out of the regulatory definition of adverse modification. Doc. 431 at 75-76. The record provides a reasoned basis for this statement in the BiOp and demonstrates that NMFS has not read the term "appreciably diminish" out of the definition.

In 2005, after *Gifford Pinchot* invalidated FWS's application of the regulatory definition in 50 C.F.R. § 402.02 because FWS had not evaluated whether the amount of habitat anticipated to be lost would impact recovery, NMFS issued a guidance memo on how to conduct "destruction or adverse modification" determination. *See* AR 00005204-209. That memo explicitly directs NMFS to identify the

current condition of the Primary Constituent Elements ("PCE")[21] of each critical habitat designation before examining how the proposed action will affect the function and conservation role of each PCE. *Id.* Federal Defendants do not assert that this guidance has invalidated the "appreciably diminishes" aspect of the critical habitat regulation. Doc. 515 at 29. Rather, the guidance memo, which instructs NMFS to "discuss the significance of anticipated effects to critical habitat," is sufficient to implement an "appreciably diminish" standard. AR 00005208[22] (emphasis added). The guidance memo's requirement of "significant" impacts to critical habitat is consistent with the regulatory definition of adverse modification to include only those alterations that "appreciably diminish[] the value of critical habitat."

Because an agency's rationale must be upheld if it can "reasonably be discerned," *see Modesto Irr. Dist. v. Gutierrez*, 619 F.3d 1024, 1035 (9th Cir. 2010), there is no requirement that the agency use "magic words" in its analysis. The key question is whether the record supports the adverse modification findings in the BiOp. In other words, does the record demonstrate that Project operations will have a significant (i.e., appreciable or considerable) impact on the

[21] PCEs are those elements of a critical habitat designation deemed essential for the conservation of the listed species and are described as the sites and habitat components that support one or more life stages or requirements of the species. PCEs are made up of essential features, which are needed to support that specific life-stage requirement. An example is the PCE of spawning habitat, which includes such essential features as clean spawning gravel, clean water, and appropriate water temperatures. *See* BiOp at 56.

[22] The pages in this document appear to be out of order in the AR. What appears to be page 3, AR 00005208, is before what appears to be page 2, AR 00005209.

critical habitat of each of the listed species for which adverse modification was found.

The BiOp examines impacts to critical habitat at length. For each species, the BiOp describes the PCEs of that species' critical habitat, examines the current status of the critical habitat and describes factors responsible for the current status, evaluates the impacts of current and future non-project (i.e., baseline) impacts, and describes the anticipated impacts of proposed project operations on that habitat.

a. Winter-Run Habitat Analysis.

The evaluation of winter-run critical habitat provides a representative example. There are seven PCEs of Chinook critical habitat: (1) access from the Pacific Ocean to appropriate spawning areas in the Upper Sacramento River; (2) clean gravel for spawning; (3) adequate river flows for spawning, egg incubation, fry emergency, and juvenile downstream migration; (4) appropriate water temperatures for spawning, egg incubation, and fry development; (5) uncontaminated habitat and food sources; (6) riparian habitat for juvenile development and survival; and (7) downstream migration access to the Pacific Ocean. BiOp at 90. The BiOp evaluates the current status of each of these PCEs. *Id.* at 90-92. In addition, the BiOp contains a lengthy section describing the factors responsible for the current status of the species, many of which also affect the species' habitat. *See id.* at 134-142. The BiOp concludes that the current condition of

critical habitat is degraded and has low value for the conservation of the species. *Id.* at 93.

> Critical habitat for winter-run is composed of physical and biological features that are essential for the conservation of winter-run, including up and downstream access, and the availability of certain habitat conditions necessary to meet the biological requirements of the species. Currently, many of these physical and biological features are impaired, and provide limited conservation value. For example, when the gates are in, RBDD reduces the value of the migratory corridor for upstream and downstream migration. Unscreened diversions throughout the mainstem Sacramento River, and the DCC when the gates are open during winter-run outmigration, do not provide a safe migratory corridor to San Francisco Bay and the Pacific Ocean.
>
> In addition, the annual change in TCP has degraded the conservation value of spawning habitat (based on water temperature). The current condition of riparian habitat for winter-run rearing is degraded by the channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento River system. However, some complex, productive habitats with floodplains remain in the system (e.g., Sacramento River reaches with setback levees (i.e., primarily located upstream of the City of Colusa) and flood bypasses (i.e., Yolo and Sutter bypasses).
>
> Based on the impediments caused by RBDD when the gates are in, unscreened diversions, annual changes to the TCP, the time when the DCC gates are open during the winter-run outmigration period, and the degraded condition of spawning habitat and riparian habitat, the current condition of winter-run critical habitat is degraded, and has low value for the conservation of the species.

Id. (emphasis added).

In the environmental baseline analysis, NMFS concluded climate change will negatively affect all of the Central Valley critical habitat designations at issue. *Id.* at 173. With respect to upstream habitat, NMFS evaluated the current and future environmental baseline of winter-run Chinook critical habitat in the Shasta and Sacramento Divisions of the CVP, and concluded that the current baseline is "degraded, and has low value for the conservation of the species," and

future baseline habitat impacts will "affect the fitness... of the critical habitat...." *Id.* at 181-83, 187-91. For the Delta Division, NMFS concluded that the migratory function of this critical habitat is degraded, *id.* at 203-05, and that the future environmental baseline included continued "ongoing habitat modifications" and adverse habitat impacts from levees, predation, non-native species, contaminants, entrainment, dredging, recreational boating, and temporary irrigation barriers, *id.* at 215-16.

(1) Project Impacts to Winter-Run Spawning Habitat.

In addition to these past, current, and future non-project adversities, NMFS found that proposed project operations in the Sacramento River constrain spawning habitat by providing relatively less cool water temperatures below Keswick Dam and by stranding or dewatering redds and juveniles. *See id.* at 273. The BiOp's section on the "Effects of the Action on Critical Habitat in the Sacramento River" in particular on "Spawning Habitat" provides:

> For winter-run and spring-run, potential spawning habitat is constrained by temperature control to smaller and smaller areas below Keswick Dam. The impacts of operations on cold water have already been described above. However, the changes to the habitat downstream are far more widespread and difficult to detect. The volume of water stored in Shasta reservoir tends to dampen the seasonal variation in water temperatures. This moderation of water temperatures, combined with a loss in spawning habitat above Shasta and Keswick dams, may have profound effects on life history patterns. Warmer water temperatures during the spring-run and CV steelhead egg incubation have resulted in earlier emergence time. Spawning habitat, which is now located 60 to 240 miles downstream from historical sites above Shasta Dam, truncates the juvenile emigration timing by 2-3 months. Therefore, juveniles leave the spawning area at much smaller size and are less likely to survive downstream. For steelhead the cold summer-time flow regime favors residency

> over anadromy, which reduces the variability in life history that distinguished runs. In addition, with more spatial and temporal overlap between the listed anadromous salmonid species, competition for space reduces the value of the spawning habitat for the conservation of any one species.
>
> The value of spawning habitat for the conservation of the species is also reduced by flow fluctuations twice a year every year to install and remove the ACID diversion dam. These sudden drops in flow strand and/or isolate juveniles rearing along 5 miles of habitat above the diversion dam, and likely for miles downstream. Flow fluctuations can also dewater winter-run and fall-run redds. Since the majority of winter-run have shifted to spawning above the ACID diversion dam (e.g., 62 percent in 2006), flow fluctuations are likely to have greater impacts in future years.
>
> Climate change, as a modeled future baseline stressor, is likely to reduce the conservation value of the spawning habitat PCE of critical habitat by increasing water temperatures, which will reduce the availability of suitable spawning habitat. Cold water in Shasta Reservoir will run out sooner in the summer, impacting winter-run and spring-run spawning habitat. This reduction in an essential feature of the spawning habitat PCE will reduce the spatial structure, abundance, and productivity of salmonids.

Id. at 273. Spawning habitat has been impacted by baseline conditions (such as the presence of Shasta and Keswick Dams) and climate change. The BiOp provides explanation for its conclusion that additional Project operations will add to those baseline impacts. As to winter-run spawning habitat, the section references an earlier discussion of "the impacts of operations on cold water;" addressing CALSIM II modeling runs, comparing temperature conditions (and resulting egg mortality) between baseline operations and operations under the proposed action. Figure 6-14, which depicts winter-run egg mortality by water year type, permits comparison of the baseline (Study 7.0), near future project operations (Study 7.1) and future project operations (Study 8.0).

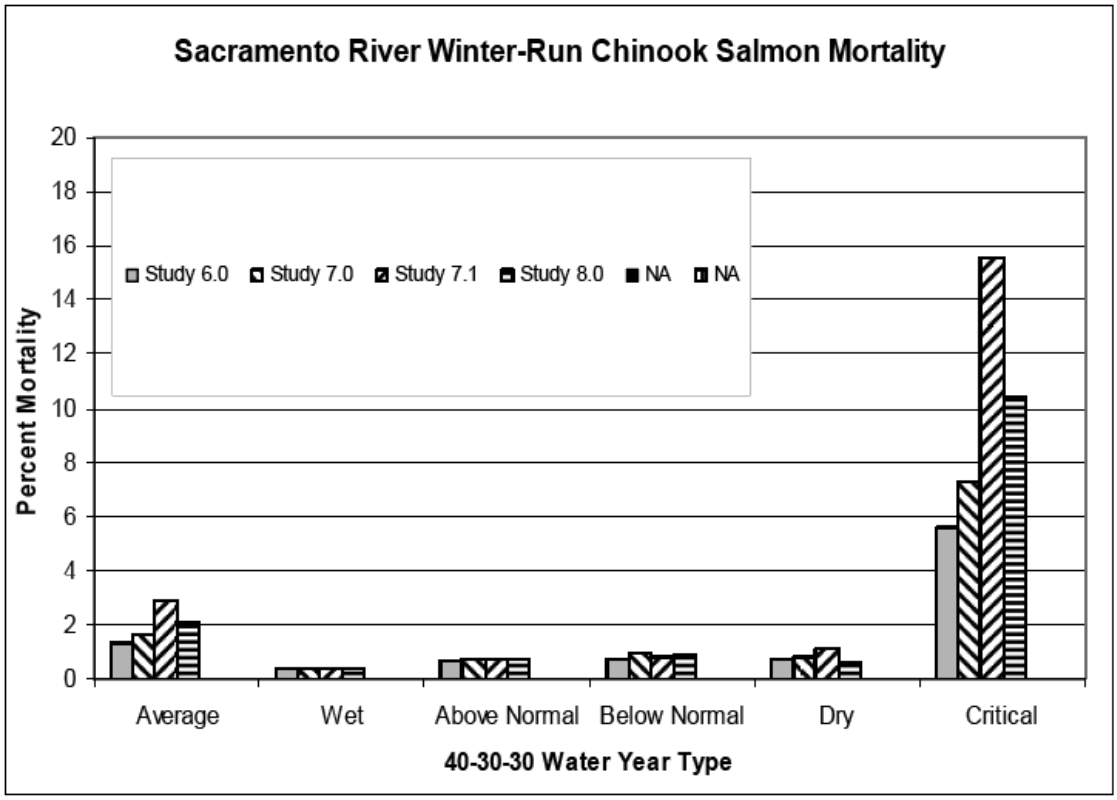


Figure 6-14. 2008 Winter run average egg mortality by water year type at Balls Ferry. Study 6.0 represents 2004 operations, study 7.0 represents current operations, 7.1 represents near future operations, and 8.0 represents future operations (CVP/SWP operations BA figure 11-39).

Id. at 259. These results show that in critical years, which are 15 percent (15%) of the years modeled, egg mortality more than doubles between Study 7.0 and Study 7.1, and increases by 50 percent between Study 7.0 and Study 8.0, under past and future operations. (No explanation is given for why study 7.1 shows higher mortality than Study 8.0.) Because egg mortality is a direct result of temperature conditions in winter-run spawning habitat, this demonstrates that Project operations will significantly reduce spawning habitat in critical years.

(2) Project Impacts to Rearing and Migratory Habitat.

Information to support NMFS's finding of significance for winter-

run rearing and migratory habitat is less apparent. In Section 6.3.8 ("Effects of the Action on Critical Habitat in the Sacramento River"), the BiOp reviews impacts to rearing and migratory habitat very generically:

> 6.3.8.2 Rearing Habitat
>
> Stream flows within the Sacramento River have been altered by the operations of Shasta and Keswick dams. Generally, the changes have increased flows during the summer and fall, and decreased flows in the winter and spring compared to historical conditions (figure 5-13). The result of the change in historical flow patterns has been a decrease in the hydrologic variability and a loss of complexity in the freshwater aquatic habitat. Specific areas of rearing habitat loss due to changes in the flow pattern include fewer oxbows, side channels, braided channels, less LWD, and less shaded aquatic riparian habitat. The Nature Conservancy (2007) model shows that these are necessary for proper functions of riverine ecosystems. A more natural flow regime with higher spring flows and lower summer flows would support riverine functions like the creation of oxbows, side channels and more varied riparian communities. In turn, this would increase cottonwood regeneration, shaded aquatic habitat, food supply, rearing areas, and LWD recruitment, all important components that are being degraded under continued project operations.
>
> The decrease in the biological value of the rearing habitat is due to the simplification of the processes that create these important areas. The CVP and SWP have for years used the river as a conveyance system, neglecting the natural processes that are necessary to support river dependent species. This altered stream flow pattern has indirectly led to an increase in bank stabilization, levees, riprap, and armoring to keep the river in place. The reduction in rearing habitat quality has decreased the survival of juvenile salmonids and favored the proliferation of introduced non-native species that prey or compete with juvenile salmonids. Due to the stream flow changes, introduced warm water predators are much more numerous today than historically. Therefore, the conservation value of rearing habitat along the entire 300 miles has been degraded by project operations.

Rearing habitat for CV steelhead has been modified in the Sacramento River to cooler summer time releases for winter-run spawning. This change in summer temperature regime has increased the resident rainbow trout population. The change in summer temperatures may reduce the number of steelhead that choose to migrate to the ocean because conditions are too favorable. If the resident trout population is as large as the trout population above Shasta dam (i.e., estimated at 10,300 trout per mile), then competition for food and space could reduce the value of the rearing habitat PCE.

Climate change, as modeled future baseline stressor, is likely to reduce availability of rearing habitat, and in turn, the value of the rearing habitat PCE of critical habitat, by increasing water temperatures. As the juveniles migrate downstream, they will emigrate earlier, encounter thermal barriers sooner, and be subjected to predators for longer periods of time. This reduction in the essential elements of critical habitat will reduce the spatial structure, abundance, and productivity of salmonids. Juveniles would be expected to concentrate in areas of cold water refugia, like in the few miles below Keswick Dam, where competition for food, space, and cover would be intense. Those individuals that stayed to over summer would be forced into one life history pattern consistent with project operations (i.e., yearling life history and emigration during the following spring). Those juveniles that did emigrate early would be exposed to greater stress regimes as they encounter higher water temperatures and greater concentrations of predators downstream.

6.3.8.3 Migratory Corridors

The conservation value of the migratory corridor along the mainstem Sacramento River for all 4 listed species is degraded by the presence of barriers to upstream and downstream migrations.

An essential feature of the migratory corridor PCE is unobstructed passage of emigrating fish through the upper Sacramento River to the spawning areas. This characteristic of the PCE will continue to be degraded by the continued operation of the RBDD and ACID diversion dam. Adult salmonids are blocked and/or delayed in passing these obstructions. Juveniles are subjected to higher concentrations of predators at these locations. Entrainment losses will continue into the future from operation of fish screens at these diversions.

RBDD backs up water on the Sacramento River to form Lake Red Bluff during the summer months, when juvenile winter-run are migrating downstream. This action reduces the conservation value of the critical habitat within the 6-mile lake (or 15 miles of shoreline) for winter-run, spring-run and CV steelhead (TCCA 2008). The inundation of the Sacramento River slows down flows, covers riparian areas, warm water predators become more numerous, and the value of the habitat is reduced. Juvenile salmon and steelhead are disoriented and confused as they migrate downstream through the lake, similar to what happens on the Columbia River above its dams. Stranding and isolation occur in sloughs adjacent to the lake when the gates come out in September (USFWS 1998). The rising waters in the spring kill any vegetation along the sides by submerging it underwater and covering it with silt. Water temperatures increase in the lake as flows are slowed and surface water is heated by the sun. Large shade trees and riparian areas are prevented from becoming established leaving the near shore areas devoid of vegetation. Food supply, shelter and cover are reduced by this action and will continue to be reduced under future operations until a new pumping plant is built and operational.

Approximately, 8 miles of river habitat is modified (or 13.3 percent of the available habitat above RBDD) to less suitable lake habitat for 4 to 6 months of every year when the diversions are in place (i.e., 6 miles above RBDD, and 2 miles above ACID). This seasonal loss of habitat reduces food availability, shelter, and cover, and causes permanent changes that reduce the value of that habitat for the rest of the year (i.e., from sedimentation, loss of shaded aquatic habitat, loss of riffle areas that produce food). The loss of habitat value leads to a reduction in the abundance of juvenile winter-run and spring-run that enter the Delta. Productivity and growth are also reduced from modified habitat and reduced complexity. Juvenile salmonids reach the Delta sooner and at a smaller size, making them more vulnerable to predation. Larger fish are more likely to survive the stressful transition into the marine environment than smaller fish, which have less energy reserves stored in their bodies. Therefore, salmonids with life history stages (representing a year in freshwater) like spring-run yearlings and CV steelhead smolts are less likely to be affected by these habitat changes in the migratory corridor, since they move through mainstem quickly prior to entering the ocean.

BiOp at 273-74.

The BiOp's "Synthesis of Effects" provides the following additional discussion of rearing habitat:

> 9.2.2 Project Effects on Sacramento River Winter-Run Chinook Salmon Critical Habitat
>
> Critical habitat for winter-run is comprised of physical and biological features that are essential for the conservation of winter-run, including freshwater spawning sites, rearing sites, and migration corridors to support one or more life stages of winter-run. As summarized below, the conservation value of critical habitat throughout the Sacramento River from Keswick Dam to the Delta (302 miles) will be degraded by the proposed action.
>
> ***
>
> 9.2.2.2 Rearing Habitat
>
> The value of rearing habitat will continue to be degraded as hydrologic conditions resulting from operations favor the proliferation of introduced non-native warm water predators of juvenile salmonids.
>
> Reclamation will continue to operate RBDD (modification of 6 miles of free-flowing riverine habitat to lake-like habitat) and the ACID diversion dam (modification of 3 miles of free-flowing riverine habitat to lake-like habitat) for 4 to 6 months of every year. Food supply, shelter, and cover will continue to be reduced during the 4 months that the gates are in. In the future full build out scenario, the value of rearing habitat will improve when the gates are out for up to 10 months of each year. However, stranding and isolation in sloughs adjacent to the lake would still occur, and riparian habitat will not likely establish.
>
> 9.2.2.3 Migratory Corridors
>
> The value of upstream and downstream migratory corridors will continue to be degraded as a result of the continued operation of RBDD and the ACID diversion dam, which preclude unobstructed passage. The creation of Lake Red Bluff results in the reduction in value of rearing habitat and degradation of 15 miles of shoreline that slows down flows, inundates riparian areas, and increases habitat for warm water predators. The value of the migratory corridor will also continue to be degraded when the RBDD gates come out in September and cause stranding and isolation in sloughs adjacent to the lake. In the future full build out scenario (2030, which we assume the effects will be realized starting

> in year 2019), the 10-month gates out and 2-month (which is really 2½ months) gates in scenario will improve the value of the migratory corridor by providing unobstructed passage.
>
> During outmigration, the DCC, when the gates are open, continues to degrade the value of the mainstem Sacramento River as a migratory corridor by entraining a portion of the outmigrating juveniles into the Central Delta, where survival and successful outmigration to the Pacific Ocean is lower than if the juveniles remained in the main migratory corridor of the Sacramento River. The proposed action exacerbates this problem by altering water movement through the Sacramento River and Delta such that water in the north part of the Delta (e.g., immediately upstream of the DCC) is pulled southward towards the Federal and State pumping plants through the DCC and/or Georgiana Slough.

Id. at 469-70. The next sub-section assesses risk to winter-run critical habitat.

> 9.2.3 Assess Risk to the Winter-Run Chinook Salmon Critical Habitat
>
> Many of the physical and biological features that are essential for the conservation of winter-run are currently degraded. As a result of implementing the proposed action, some of those physical and biological features will likely remain the same, which will keep their conservation value low. However, the conservation value of many of the physical and biological features will likely be further degraded. For example, the proposed action will further degrade the value of spawning, rearing, and migratory habitat. Reoperation of RBDD in the future full build out scenario, so that the gates are down for 2½ months instead of the 4-month near-future (i.e., 2009-2019) scenario, will slightly improve the value of rearing and migratory habitat. However, the conservation value of these habitats will remain degraded by other stressors related to both the proposed action and the baseline (see figure 9-4).
>
> The effects of the proposed action under climate change scenarios would likely further degrade the value of spawning and rearing habitat by increasing water temperatures. Cold water in Shasta Reservoir will run out sooner in the summer, degrading winter-run spawning habitat, and the value of rearing habitat would likely be further degraded by juveniles emigrating earlier, encountering thermal barriers sooner, and be subjected to predators for longer periods of time. Juveniles that do not emigrate earlier will likely congregate in areas of cold water refugia, like in the few miles below dams where competition for food, space, and cover would be intense.

> Based on the analysis of available evidence, NMFS concludes that the proposed action is likely to reduce the conservation value of the critical habitat, as designated, for the conservation of Sacramento River winter-run Chinook salmon (table 9-3).

Id. at 470.

All of these discussions of impacts to rearing and migratory habitat on the Sacramento River focus on the operation of Red Bluff Diversion Dam ("RBDD") and Anderson Cottonwood Irrigation District ("ACID") diversion dam, which obstruct passage and alter large areas of habitat. For example:

> Reclamation will continue to operate RBDD (modification of 6 miles of free-flowing riverine habitat to lake-like habitat) and the ACID diversion dam (modification of 3 miles of free-flowing riverine habitat to lake-like habitat) for 4 to 6 months of every year. Food supply, shelter, and cover will continue to be reduced during the 4 months that the gates are in. In the future full build out scenario, the value of rearing habitat will improve when the gates are out for up to 10 months of each year. However, stranding and isolation in sloughs adjacent to the lake would still occur, and riparian habitat will not likely establish.

Id. at 469. Although the BiOp does not offer a numerical analysis of what percentage of the designated rearing and/or migratory habitat is disturbed by these operations, at least for those fish that must pass these structures (the entire winter and spring-run populations) the significance of such barriers is obvious.

Similar evidence of significant impacts for other aspects of critical habitat exists for each of the species. *E.g., id.* at 260 (demonstrating significant impacts to the spring-run spawning habitat); *id.* at 501-503, 504 (summarizing project impacts to spring-run habitat), *id.* at 549-53 (same as to steelhead); *id.* at 570-71

(same as to green sturgeon proposed critical habitat, noting that "[w]hen the gates are down, RBDD precludes access to 53 miles of spawning habitat for 35-40 percent of the spawning population of green sturgeon").

Plaintiffs' argument is simply that Federal Defendants acted unlawfully by failing to directly articulate that project operations have "appreciable" or "significant" impacts on critical habitat. The test is that the agency's reasoning should reasonably be discerned from the BiOp. A number of evident causes are identified, which adversely impact the Listed Species. NMFS provided no quantification other than year-to-year population fluctuations. Data for CV Steelhead and green sturgeon are sparse. The record reflects a number of adverse modifications of the species' critical habitat. Although the BiOp does not show what proportion of the population will be affected, this is not required. The explanation of the adverse effects on habitat and how these changes have the ability to effect harm to the species is sufficient.

Plaintiffs' motion for summary judgment that the critical habitat analysis is unlawful because NMFS did not apply the proper standard for adverse modification is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

E. Use of Surrogates.

In the effects analysis, the BiOp utilized fall-run Chinook salmon as a surrogate for steelhead, and hatchery Chinook salmon as a

surrogate for wild Chinook salmon. Plaintiffs argue that NMFS violated the best available science standard by failing to "validate" its use of surrogate species. Doc. 431 at 81.

Plaintiffs' expert Kenneth Cummins opines that there is a consensus in the scientific community that, whenever possible the use of surrogates should be avoided. Cummins Decl., Doc. 445 at ¶ 8. Surrogates should be a "tool of last resort." *Id.* This is undisputed.

Dr. Cummins further opines that "for a surrogate to be appropriate, it should share the same key ecological or behavioral traits that make the target ... sensitive to environmental disturbance and the relationship between population vital rates (for example, survival) and level of disturbance should match that of the target." *Id.* at ¶ 11 (citing Caro *et al.* (2005)). Dr. Cummins maintains that because "all species are different to some degree in regards to their life history strategies, ecological relationships with other species, and selection and use of habitat, substituting data from one species to draw inferences about another for purposes of conservation planning without validating that decision a priori is not justified." *Id.* at ¶ 14. He continues: "since no two co-occurring species are biologically identical, that would seem to rule out management planning for one species that is informed using biological information that is available for another unless use of a surrogate species for the target species is validated." *Id.* Dr. Cummins cites a study by

Favreau, *et al.* (2006), which found that "in less than 2 percent of the cases examined did a surrogate represent the target species better than a random selection of potential surrogates. Further, in less than 4 percent of the cases could the surrogate be considered as effective in representing the target species." *Id.* From this, Dr. Cummins concludes:

> This makes it clear that without detailed data supporting very similar responses of juvenile Chinook salmon and juvenile steelhead to specific stressors, such as a given set of flow conditions, there is no scientific justification to choose Chinook as a surrogate over any other co-occurring species.

Id. Dr. Cummins describes "various approaches to validation that scientists may employ before relying on surrogate data."

> One approach to validation sets forth three criteria that must be met in order to use a surrogate confidently: (1) establish the relationship between levels of environmental disturbance and demographic vital rates for the surrogate species; (2) identify the key traits that affect demographic viability in both the surrogate and target species with regard to the environmental disturbance; and (3) establish the relationship between the key trait and the disturbance threshold Caro *et al.* (2005). Under this approach NMFS should have identified the key traits for both Chinook and steelhead that affect their survival as they migrate through the Delta. NMFS failed to do this.

Id. at ¶ 15. The problem with Plaintiffs validation argument, and Dr. Cummins' related opinions, is that they require that NMFS conduct new experiments to justify reliance on existing experimental data. For this reason, those portions of Dr. Cummins' declarations that opine NMFS should have conducted validation experiments were stricken from the record. *See* Doc. 536 at ¶ 15; *see also S.W. Ctr. for Biological Diversity v. Babbitt*, 215 F.3d 58, 60 (D.C. Cir. 2000) (best available science standard does not impose an obligation to

conduct independent studies). The record does not support Plaintiffs' validation requirement argument.[23]

To the extent Plaintiffs advance a more generic challenge to NMFS's use of surrogates, NMFS explained its use of surrogates and addressed the limitations of surrogate data:

> NMFS understands that the use of surrogates in the form of hatchery releases (e.g., late fall-run to determine spring-run behavior), different species (e.g., Chinook salmon to determine steelhead behavior; Atlantic or shovelnose sturgeon to determine effects of contaminant exposures on green sturgeon), and even the same run and species (e.g., hatchery fish and laboratory studies to determine wild/natural fish behavior) may not accurately predict or emulate the exact behavior of the species under analysis in its natural environment in order to determine exact fish routing, timing, duration of migration, and export pumping entrainment patterns. However, when direct evidence or similar evaluations are not available for the species under analysis, NMFS has utilized data and results from the use of surrogates that exhibit strong similarities in physiological needs, in life history stages, and in general behaviors. In the absence of data on salmonids and green sturgeon in the wild, NMFS considers these studies one of the best available sources of information used to determine the potential effects of CVP/SWP operations.

BiOp at 62. NMFS maintains that the use of surrogates "minimizes the amount and extent of take associated with tagging or capturing listed species to monitor take." *Id.* at 62-63. Appendix 3 of the BiOp contains a comparison of delta survival rates between hatchery and wild Chinook. BiOp App. 3, at 10-11.

One of the draft BiOp peer reviewers considering the BiOp's analyses of winter- and spring-run Chinook noted: "where information

[23] It is unclear whether Dr. Cummins is correct to assert that validation is standard practice in the field. Garwin Yip opines that his review of tagging studies in the Pacific Northwest reveals that the surrogate validation process is not typically used due to increased time and funding required to complete the validation process. Third Yip Decl., Doc. 518 at ¶ 16.

was lacking, reasonable surrogates are used." AR 00061498. Plaintiffs' own experts, *e.g.*, Mr. Cramer, Dr. Hanson, and Mr. Cavallo, used data from experiments utilizing surrogates without independently validating the surrogates. *See* Second Yip Decl., Doc. 481 at ¶ 33; Third Yip Decl., Doc. 518 at ¶ 16. It is undisputed that in many circumstances unverified surrogate data was the only data available for use by NMFS to evaluate the impact of project operations on the Listed Species. Eliminating the surrogate data would have "considerably limit[ed] the utility of any biological analyses undertaken" in the BiOp. *Id.* at ¶ 14.

Plaintiffs' motion for summary judgment that the BiOp's use of surrogates violated the ESA's best available science standard is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. The agency recognized there were shortcomings in using surrogates. This is a dispute among scientists.

F. Challenges to the Reasonable and Prudent Alternative.

1. RPA Action IV.2.1.

Action IV.2.1 limits export pumping from April 1 through May 31 and has two requirements. First, the Action requires a minimum flow, as measured at Vernalis, based on an index of storage at New Melones Reservoir ("New Melondes Index"). BiOp at 642; BiOp App. 5 at 71. The Vernalis flow requirement is not challenged.

The second requirement of Action IV.2.1 restricts combined CVP and SWP export pumping based on the flows at Vernalis, with the

permissible level of exports rising in relation to increased flows at Vernalis. BiOp at 642; BiOp App. at 71-72. The action is phased. Phase I governs operations during 2010 and 2011, when combined CVP and SWP exports were restricted as follows:

Flows at Vernalis (cfs)	Combined CVP and SWP Export
0-6000	1,500 cfs
6,000-21,750	4:1 (Vernalis flow:export ratio)
21,750 or greater	Unrestricted until flood recedes below 21,750

BiOp at 642. Under Phase I, the baseline export rate is set at 1,500 cfs, deemed an operational minimum required to address health and human safety needs. *Id.* at 74. Flood warning stage at Vernalis is 21,750 cfs. *Id.* at 71 n.2.

During Phase II, which operates from 2012 on, combined exports are governed by the following table from April 1 through May 31:

San Joaquin Valley Classification	Vernalis flow (cfs): CVP/SWP combined export ratio
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750.

Id. at 643-44. Action IV.2.1 includes an exception for multiple dry years and a health and safety exception. *Id.* at 644.

Action IV.2.1 is designed primarily to "reduce the vulnerability of emigrating CV steelhead within the lower San Joaquin River to entrainment into the channels of the South Delta and at the pumps caused by the diversion of water by the export facilities in the South

Delta, by increasing the inflow to export ratio." BiOp at 641. A secondary purpose of Action IV.2.1 is to more generally "enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the main stem of the San Joaquin River for emigrating fish, including greater net downstream flows." *Id.*

Both the Export Plaintiffs and DWR have twice previously sought injunctive relief against the imposition of Action IV.2.1. On May 18, 2010, Action IV.2.1 was addressed in Findings of Fact and Conclusions of Law, granting in part and denying in part Plaintiffs' motion for preliminary injunction:

> The evidence supports NMFS's general finding that some form of restriction on the Vernalis flow/export ratio is needed to prevent jeopardy to the SSNDG of CV Steelhead. Enjoining any flow/export ratio restriction will appreciably diminish the likelihood of the SSNDG's survival or recovery and/or adversely modify its critical habitat.
>
> a. Mr. Stuart testified that enjoining Action IV.2.1 would "jeopardize" the SSNDG of CV steelhead, 3/31/10 Tr. 122:9, 121:3-5, which in turn would "further decrease the viability of the Central Valley" steelhead DPS, *id.* at 104:2-3. Plaintiffs' expert, Mr. Cramer, did not provide an opinion on the impact of enjoining Action IV.2.1 on the SSNDG of CV steelhead. *Id.* at 24:23-25:1.
>
> b. For critical habitat, Mr. Stuart opined that Action IV.2.1 provides benefits by enhancing migratory corridors, increasing riparian zones and rearing areas which can be used by migrating juveniles, and shortening migration time and increasing turbidity, both of which can decrease vulnerability to predation. *Id.* at 110:24-111:14. Mr. Stuart testified that enjoining Action IV.2.1 would remove these beneficial effects. *Id.* at 111:1-2, 121:13-19; *see also* Gov't Salmon Ex., ¶4 (enjoining Action IV.2.1 would "negate"

> the benefits provided by Action IV.2.1). Mr. Cramer did not opine what effect enjoining Action IV.2.1 would have on CV steelhead critical habitat. 3/31/10 Tr. 25:7-11, 110:24-25, 111:1-2 (Stuart testimony that Mr. Cramer "didn't look at the effects of the flow on enhancing critical habitat in migratory corridors in the Delta").
>
> ***
>
> Action IV.2.1 also helps spring-run Chinook salmon, because "the reduced export rates [caused by Action IV.2.1] create a more positive OMR flow within the southern central Delta," resulting in less fish entrained when entering the San Joaquin River at Mokelumne. 3/31/10 Tr. 124:9-15.
>
> However, the record does not support a finding that the specific Vernalis flow to export ratios imposed by Action IV.2.1 (as opposed to lesser or greater ratios) are necessary to avoid jeopardy and/or adverse modification to any of the Listed Species. The total absence of explanation for the exact flow limits chosen makes Action IV.2.1 arbitrary and capricious.

Doc. 347 ¶¶ 99-102 (internal paragraph numbers omitted from quotation to avoid confusion). The injunction decision found likely success on the merits, but requested additional information on the status of the species before ordering injunctive relief:

> Injunctive relief is also warranted under the ESA, because, although the general premises underlying Actions IV.2.1 ... find marginal support in the record, the precise flow prescriptions imposed on coordinated project operations as part of Action IV.2.1's Vernalis flow/export ratio ... are not supported by the best available science and are not explained as the law requires.
>
> Injunctive relief cannot be imposed without up-to-date evidence of the status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws. The evidence has not sufficiently focused on remedies to provide a confidence level that completely removing the Vernalis flow to export ratio prescriptions of Action IV.2.1 ... to increase water supply will not jeopardize the continued existence of the

species and/or adversely modify their critical habitats. *Id.* at 133-34.

After receiving additional evidence about the status of the species, Action IV.2.1 was enjoined for a limited period of time (from May 26 through May 31, 2010), in part because only a small percentage of the population of concern, the SSNDG of CV Steelhead, remained in the area that would be impacted by the injunction. Doc. 380.

A second motion for injunctive relief was filed against Action IV.2.1 in February 2011, Doc. 538, and then withdrawn in light of wet hydrologic conditions that obviated the need to implement the challenged aspects of the Action in this water year. Doc. 625, filed March 30, 2011.

Export Plaintiffs and DWR again challenge the scientific basis for Action IV.2.1. Export Plaintiffs' and DWR's briefs on the issue substantially overlap.

a. Does the Record Support NMFS's Imposition of an Flow:Export Ratio Requirement?

(1) Studies Cited by DWR.

DWR's principle argument is that the last twenty years of San Joaquin River fisheries studies have not produced any statistically significant evidence of a negative relationship between salmonid survival and project pumping. Doc. 446-1 at 11. DWR's expert, Bradley Cavallo, refers to various statistical analyses of San Joaquin River salmonid experiments that reveal either no statistically significant relationship, or a positive one. His citation to a study

by Kjelson, Loudermilk, Hood, and Brandes, "The Influence of San Joaquin River Inflow, Central Valley and State Water Project Exports and Migration Route on Fall-Run Chinook Smolt Survival in the Southern Delta During the Spring of 1989," published in 1990, is representative of these critiques. Kjelson, *et al.* (1990) concluded:

> Survival of tagged smolts released under low export conditions was not greater than for those released under high export conditions (Table 4). This was an unexpected result as we believed conditions for survival should have improved when exports were lowered, since direct losses at the Project facilities were decreased, flow in the mainstem San Joaquin was increased and reverse flows in the Delta were eliminated.

AR 00122358-59 (cited in Cavallo Decl., Doc. 452 at ¶8a).

Mr. Stuart, the lead author of the Delta section of the BiOp, asserts that Mr. Cavallo has selectively quoted from the relevant studies. For example, as to the Kjelson, *et al.* study:

> ...Mr. Cavallo selectively cites a paragraph from the Kjelson *et al.* (1990) study without including the discussion concerning the results of the study. Kjelson *et al.* reached a different conclusion as to the potential role of exports than would be arrived at by reading Mr. Cavallo's excerpt from his declaration. Starting on page 11 of the Kjelson *et al.* study, the authors discuss the potential reasons for the lower survival during lower export levels. NMFS 122357. These included: (1) the duration of the low export period in May 1989 under the low San Joaquin River flow conditions was too short, thereby not allowing the tagged smolts sufficient time to successfully exit the Delta before high export conditions were resumed, (2) a short curtailment period may be sufficient if San Joaquin River flows are high compared to the export rates at the time of smolt migration, (3) the relatively low number of tagged fish released under each export period that would make recovery at Chipps Island difficult if survival was low, and (4) elevated temperatures and poor trucking survival for the Stanislaus River releases that potentially lowered initial survival rates, thus biasing the export relationship. Kjelson *et al.* finishes with recommendations for future

> studies, including: (1) a wider range of inflow to export ratios assessed, particularly between 1 and 5 when river flows are above 5,000 cfs in the San Joaquin River, and (2) document the proportion of fish that enter upper Old River under various flow, export, and tidal conditions. The fact that Mr. Cavallo did not offer these additional points in his declaration limits the utility of his opinion.

Fourth Stuart Decl., Doc. 485 at ¶ 13. The BiOp specifically discussed Kjelson, *et al.* (1990)'s conclusions in Appendix 5:

> In a study assessing the influence of San Joaquin River inflows, state and federal exports and migration routes, Kjelson *et al.* (1990) released experimental fish (coded wire tagged hatchery Chinook salmon) during the spring of 1989 at Dos Reis on the San Joaquin River below the head of Old River, and in Old River itself downstream of the head under conditions with low San Joaquin River flow (≈ 2,000 cfs) and high/low export conditions (10,000 cfs and 1,800 cfs). The results of the study were unexpected as the rate of survival was not greater for the low export conditions compared to the higher export conditions. Upon further examination of the data, Kjelson *et al.* found that survival was comparatively lower for all upstream release groups that year compared to other studies conducted in previous years. In addition, Kjelson *et al.* surmised that the short period of reduced exports (7 days) was not long enough to allow fish to exit the system and move beyond the influence of the exports when higher pumping resumed. Based on the times to recovery at Chipps Island, it was concluded that a sizeable proportion of the released fish were still in the Delta when the higher export levels resumed. This conclusion is further reinforced by the salvage of fish released at Jersey Point, indicating that fish were drawn upstream into the interior of the Delta and towards the pumps. The study, although having several significant flaws, did conclude that survival was higher in the main stem San Joaquin River compared to Old River and that survival in the Delta interior was lower compared to the western Delta (i.e., Jersey Point releases). The authors cautioned about drawing conclusions about export rates and survival from the data due to its obvious flaws.

BiOp App. 5 at 5-6.

DWR correctly rejoins that Mr. Stuart does not contest that Kjelson, *et al.* (1990) concluded that survival was lower during low

exports than high exports. DWR is also correct that Mr. Stuart does not explain how the study "affirmatively supports the United States' claim that a relationship exists between project exports and smolt survival sufficient to justify the Inflow/Export ratio." Doc. 495 at 16. Mr. Stuart never opined that Kjelson's study provides such affirmative support. The BiOp considered the study, its caveats, and acknowledged the study's "surprising" conclusion that survival was not higher during low export conditions.

Mr. Cavallo quotes from five more studies, Cavallo Decl., Doc. Doc. 452 at ¶ 8:

- Brandes and McLain, "Juvenile Chinook Salmon Abundance, Distribution, and Survival in the San Sacramento-San Joaquin Estuary," Fish Bulletin 179, Vol. 2 (2001):

> To determine if exports influenced the survival of smolts in the San Joaquin Delta, experiments were conducted in 1989, 1990 and 1991 at medium/high and low export levels. Results were mixed showing in 1989 and 1990 that survival estimates between Dos Reis and Jersey Point were higher with higher exports whereas in 1991 between Stockton and the mouth of the Mokelumne River (Tables 11 and 12) survival was shown to be lower (0.008 compared to 0.15) when exports were higher.... In addition, results in 1989 and 1990 also showed that survival indices of the upper Old River groups relative to the Jersey Point groups were also higher during the higher export period, but overall still about half that of the survival of smolts released at Dos Reis (Table 11).

AR 00109602-604.

- San Joaquin River Group Authority, "2005 Annual Technical Report":

> Regression of exports to smolt survival without the HORB were weakly or not statistically significant (Figure 5-17) using both the Chipps Island and Antioch and ocean recoveries, but both relationships indicated survival increased as exports increased."

AR 00134289-90.

- California Department of Fish and Game, "Final Draft 11-28-05 San Joaquin River Fallrun Chinook Salmon Population Model"

> There is no correlation between exports and adult salmon escapement in the Tuolumne River two and one-half years later (Figure 24).

AR 00212424, 00212477.

- Mesick, McLain, Marston and Heyne, "Draft Limiting Factor Analyses & Recommended Studies for Fall-run Chinook Salmon and Rainbow Trout in the Tuolumne River" (February 27, 2007)

> [P]reliminary correlation analyses suggest that the combined State and Federal export rates during the smolt outmigration period (April 1 to June 15) have relatively little effect on the production of adult recruits in the Tuolumne River compared to the effect of winter and spring flows. Furthermore, reducing export rates from an average of 264% of Vernalis flows between 1980 and 1995 to an average of 43% of Vernalis flows and installing the head of Old River Barrier between 1996 and 2002 during the mid-April to mid-May VAMP period did not result in an increase in Tuolumne River adult recruitment (Figures 3 and 17).

AR 00125522.

- Ken B. Newman, "An Evaluation of Four Sacramento-San Joaquin River Delta Juvenile Salmon Survival Studies" (March 31, 2008) (AR 00127144.)

> The Bayesian hierarchical model analyzed the multiple release and recovery data, including Antioch, Chipps Island, and ocean recoveries, simultaneously.... There was little evidence for any association between exports and survival, and what evidence there was pointed towards a somewhat surprising positive association with exports.

AR 00127219-00127220.

Mr. Stuart now submits alternative explanations to support his opinion why each of these studies does not definitively rule out a relationship between exports and survival:

- Brandes and Maclain (2001) elsewhere concludes that direct

mortality at the pumps is higher when exports are higher. Fourth Stuart Decl., Doc. 485 at ¶ 14 (citingAR 000109605-07).

- While the San Joaquin River Group Authority ("SJRGA") 2005 VAMP Technical Report did not find a statistically significant relationship between exports and smolt survival without HORB in place, the report does explain that there are apparent relationships between survival and the flow to export ratio. *See* AR 00134293 (suggesting survival through the Delta can be improved with increased flow/export ratios when HORB is not installed).
- The Mesick study concerned only the Tuolumne River, which Mr. Stuart admits is "extremely flow limited" making it unlikely that non-flow factors would affect escapement into that watershed. *See* Stuart Decl., Doc. 485 at ¶ 11.
- Mr. Stuart does not dispute that Newman (2008)'s analysis of VAMP data concluded "[t]here was little evidence for any association between exports and survival, and what evidence there was pointed toward a somewhat surprising positive association with exports." AR 00127220. This statement has been extensively discussed. Mr. Stuart argues out that Newman (2008) also explained that these analyses "are not the ultimate definitive explanations for what affects juvenile salmon survival through the Delta, particularly for outmigrants from the San Joaquin River," citing data limitaions, low re-capture probabilities, high environmental

variation, and "lack of balance" in the release strategy as affecting the accuracy of estimates of effects on survival. AR 00127148.

The best that can be said from all these studies is that they do not affirmatively support the purported relationship between exports and survival NMFS uses to justify Action IV.2.1's flow:export ratio. However, without more, DWR has not established that these studies were not properly evaluated. NMFS relies on additional record evidence to support imposition of Action IV.2.1's flow:export ratio limitation.

(2) Studies Cited by NMFS in Support of a Flow:Export Ratio.

(a) VAMP Data.

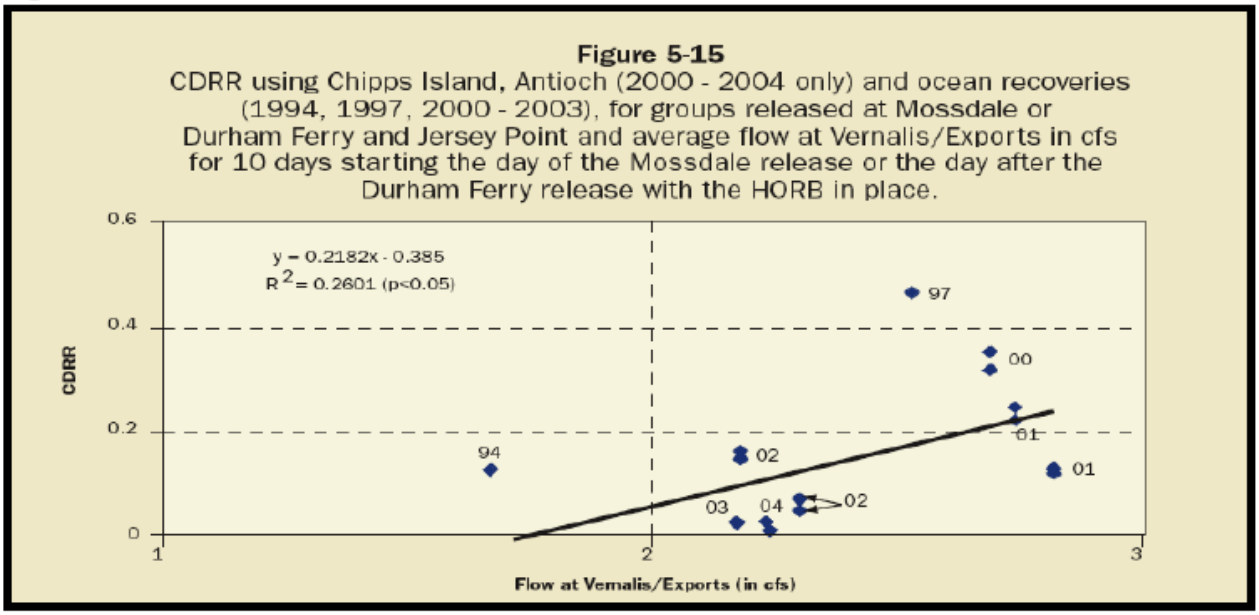
The BiOp concedes that analyses of the evidence gathered during the Vernalis Adaptive Management Program ("VAMP")[24] are equivocal regarding the impact of exports on survival. BiOp at 373. The BiOp also recognizes that the VAMP experiments may have resulted "in weak to negligible" associations because of the "correlation between flow and export rates during VAMP." *Id.* Mr. Stuart explains the VAMP experimental design was not implemented in full, in that not all of the planned relationships have been tested, with overrepresentation at

[24] VAMP is a multi-agency collaborative effort that is part of the San Joaquin River Agreement ("SJRA"). "SJRA is a negotiated settlement agreement between SJR water suppliers, water purveyors, and both State and Federal Fishery Agencies that calls for specific spring South Delta (e.g. SJR at Vernalis) river flows and Delta export pumping rates. The San Joaquin River Group Authority provides the flows necessary to attain the Vernalis flow objectives. State and Federal agencies ensure that Delta exports rates are met. [VAMP] is a scientific study that evaluates the effects of Delta inflow, and outflow, upon fall-run Chinook salmon smolt survival." AR 00212419.

certain combinations of flow and exports. Fifth Stuart Decl., Doc. 516 at ¶ 6. Mr. Stuart opined: "Newman (2008) concluded that the testing of the extremes of combinations is necessary to increase the precision of the experiments and allow discrimination of differences between the parameters." *Id.* at ¶ 50. The 2010 PI Decision found that the BiOp considered the VAMP evidence and its limitations and did not disregard any important conclusions generated from the VAMP data. *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1132-34.

Notwithstanding the lack of statistical significance, the BiOp relied on the following Figure copied from the 2006 VAMP Technical Report to demonstrate that, during times when the Head of Old River Barrier ("HORB") was in place, as the ratio between Vernalis flow and exports increased, survival increased. BiOp App. 5 at 20.

Figure 10:



Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

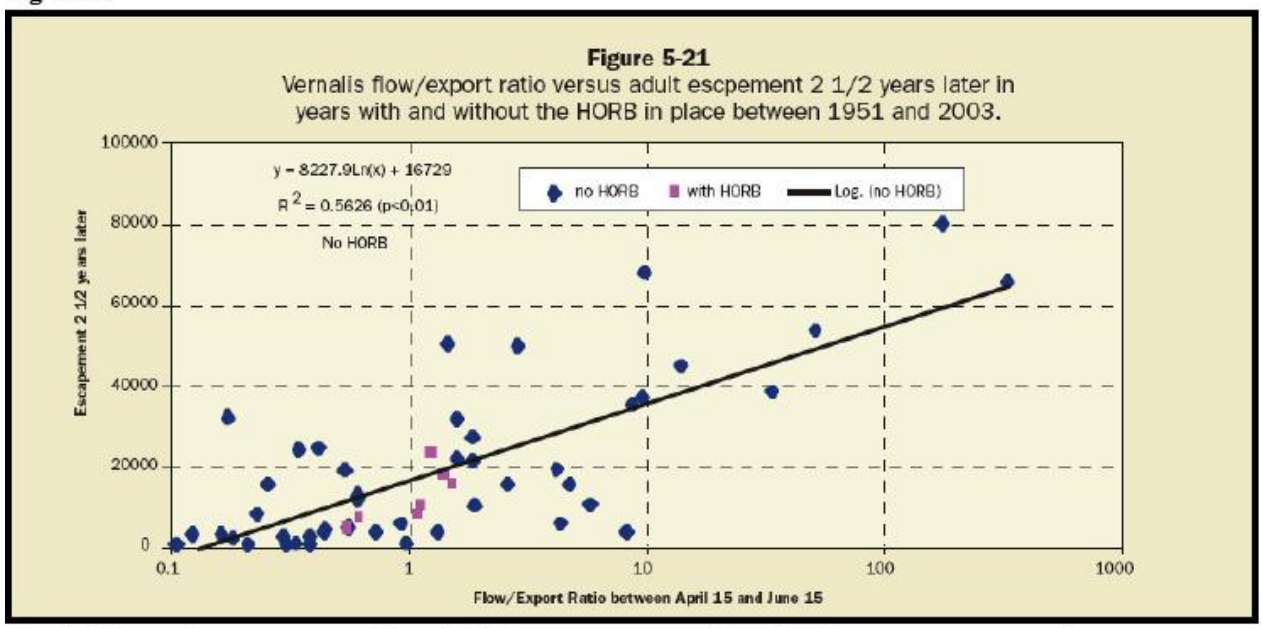
BiOp App. 5 at 20. The relationship was not statistically significant, but the BiOp states that this may have been due to the

narrow range of export rates tested. *Id.* The 2010 PI Decision found NMFS's reliance on this data was not arbitrary. *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1133-34.

(b) Escapement Data.

NMFS includes the following chart from the 2006 VAMP annual report that showed a positive relationship between the spring Vernalis flow/export ratio and adult escapement (i.e. return from the ocean to freshwater) two and a half years later, based on data from 1951 through 2003. BiOp App. 5 at 21.

Figure 11



Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

The 2010 PI Decision found it not unreasonable for NMFS to consider the analysis depicted in Figure 11. *Consol. Salmonid Cases*, 713 F. Supp. 2d at 1134.

DWR argues that NMFS's reliance on Figures 10 and 11 to support the conclusion that there is a correlation between exports and

survival is unfounded. Doc. 446-1 at 14. DWR's expert, Bradley Cavallo, compares Figures 10 and 11 to Figures 8 and 9, which plot the impact of San Joaquin River ("SJR") flow against exports:

Figure 8:

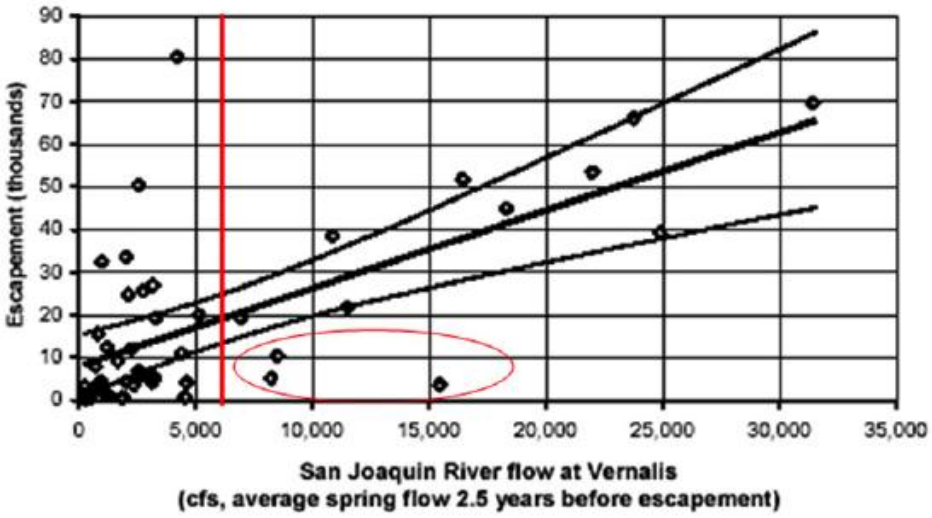
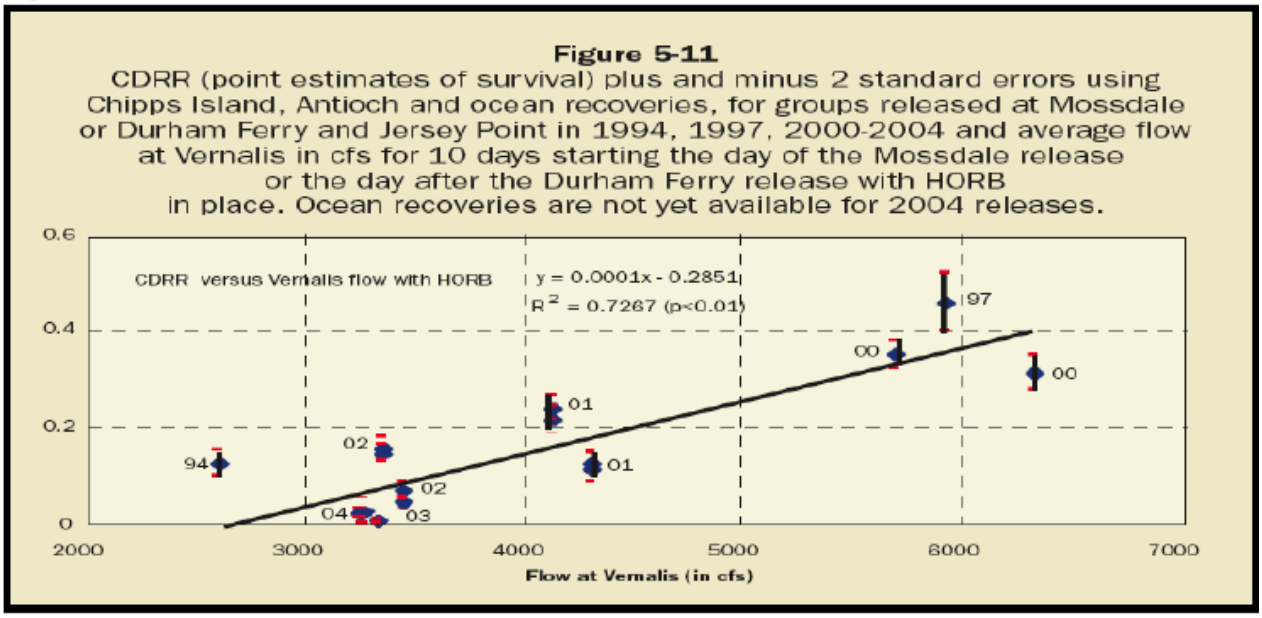


Figure 11 Total escapement to San Joaquin tributaries, 1951 through 1996, and spring flow in the San Joaquin River at Vernalis 2.5 years earlier. Fitted regression line and envelope of 95% confidence region for fitted line are shown.

Copied from Baker and Morhardt 2001.

Figure 9:



Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

BiOp App. 5 at 19. Mr. Cavallo opines that "inspection of the degree of scatter in [Figures 10 and 11] relative to [Figures 8 and 9] suggests SJR inflow to export ratio provides a poorer fit to observed data than does SJR inflow alone." Cavallo Decl., Doc. 452 at ¶ 12. For example, "the model describing smolt survival in relation to SJR flows alone (Exhibit 1, bottom) has an r^2 value of 0.73 while the comparable model with the ratio of SJR flows to exports has an r^2 value of only 0.26 (Exhibit 2, bottom). [¶] An r^2 value closer to 1 signifies that salmon survival is better explained by SJR flows (r^2 = 0.73) than by the ratio of SJR flows to exports (r^2 = 0.26)." *Id.* at ¶¶ 12-13. Although SJR flows better explain salmon survival than the ratio of SJR flows to exports, Mr. Cavallo does not opine that there is no relationship between salmon survival and the ratio of SJR flows to exports depicted in Figures 10 and 11. Although NMFS overstates and over-relies on questioned data, this is a scientific dispute among experts that does not involve error of the magnitude that rises to unlawfulness.

(c) CDFG (2005).

DWR also criticizes NMFS's treatment of a 2005 Department of Fish and Game ("CDFG") study, which provides a "description of the process [CDFG] used to develop, and apply, its Model in the formulation of spring Vernalis flow objectives that were submitted to the [State Water Resources Control Board]." AR 00212414. Mr. Stuart opined that the report "clearly shows that while flows are the primary driver,

exports play a role, albeit less than that attributable to flows." Fourth Stuart Decl., Doc. 485 at 14. DWR responds that NMFS "misrepresents the [report's] flow and export conclusions." DWR focuses on several statements from the report, including the conclusion that "Delta export level, relative to Delta inflow level, does not influence juvenile salmon survival on a regular, normal, or repetitive pattern." AR 000212423. CDFG determined that non-flow parameters, such as exports, ocean conditions, "have little, or no, relationship to fall-run Chinook salmon population abundance in the SJR and that spring flow magnitude, duration, and frequency all had significant influence upon SJR fall-run Chinook salmon abundance in the SJR." AR 00212413. CDFG excluded consideration of project exports, ocean conditions, and/or density dependence from its model because of "the lack of substantial cause and effect relationships" between these non-flow factors and abundance. AR 00212426.

DWR's contextual approach requires examination of the entire section:

> Delta Exports
>
> It has long been surmised, due to salvage of many juvenile salmon at both the State and Federal Delta export facilities in the spring months, that entrainment of juvenile salmon at the export facilities in the spring months has impacted fall-run Chinook salmon populations in the SJR. A statistically significant regression correlation relationship exists between the ratio of Delta exports and Delta inflow, from the SJR in April-June, and in-river escapement of fall-run salmon two and one-half years later (Figure 17). If the measurement metric of production cohort is used, instead of escapement 2.5 years later, the curvilinear regression correlation relationship improves (r-

square value rises from 0.44 to 0.58) (Figure 18). This seems to suggest that both flow and exports are influencing salmon production in the SJR basin. However, in every instance where salmon production was high, Vernalis flows are in excess of 10,000 cfs. Conversely when salmon production was low, Vernalis flow levels are less than 2,000 cfs (Figure 18). The question becomes is it the flow, or the exports?

In an attempt to answer this question, the Department took a closer look at smolt survival data that has been collected in recent years (data from P. Brandes USFWS). Smolt survival data collected during VAMP shows that juvenile survival increases as exports increase (Figure 19). In addition smolt survival as a function of the export to Vernalis flow ratio has a low correlation (Figure 20), indicating that Delta export level, relative to Delta inflow level, does not influence juvenile salmon survival on a regular, normal, or repetitive pattern. When exports are combined with Vernalis flow in a multiple regression against juvenile survival (both with the Head of Old River Barrier in or out), a strong positive regression occurs (as both exports and Vernalis flow increase, juvenile salmon survival increases (Figures 21 and 22)). For both cases, with either the HORB in or out, export level has a slightly stronger positive influence upon survival than does inflow level. What is surprising about this occurrence is not that export level influences survival, but that there is a positive, rather than a negative, response in juvenile survival as export level increases. It is noted that due to VAMP, when exports are up, Vernalis flows are increased with export level tied to Vernalis Flow level. This is a noteworthy Delta system operational change, as prior to VAMP there was no correlation between South Delta spring inflow level (e.g. Vernalis flow) and spring Delta export level (unpublished data). Here again, the variable that seems to be controlling salmon production (e.g. survival) is spring Delta inflow not spring Delta export.

When Delta exports are subtracted from Vernalis flow levels (Figure 23) and escapement is regressed against this difference, a statistically significant regression correlation results. There is no correlation between exports and adult salmon escapement in the Tuolumne River two and one-half years later (Figure 24). When spring Vernalis flow and spring Delta exports are regressed against salmon escapement two and one-half years later, no improvement in the flow to salmon escapement correlation occurs (VAMP

> 2005), suggesting that spring flow level, not exports, is the variable limiting salmon production in the South Delta.
>
> To summarize the relationship between exports, flow, and SJR salmon production the primary relationship suggesting that exports influence SJR salmon production is that when the ratio of exports to Vernalis flow decreases both escapement and cohort production increases. The relationships that suggest that flow, not export, is the primary factor influencing SJR salmon production are: 1) when the ratio of spring exports to spring Vernalis flow decreases, Vernalis flow greatly increases and SJR salmon production greatly increases; 2) when the ratio of spring exports to spring Vernalis flow increases, Vernalis flow greatly decreases and SJR salmon production substantially decreases; 3) juvenile salmon survival increases when spring Vernalis flow increases; 4) spring export to spring Vernalis flow ratio has little influence upon juvenile salmon survival; and 5) as the difference between spring Vernalis flow level and spring export flow level increases, escapement increases.
>
> In conclusion, while the influence of Delta export upon SJR salmon production is not totally clear, overall it appears that Delta exports are not having the negative influence upon SJR salmon production they were once thought to have. Rather it appears that Delta inflow (e.g. Vernalis flow level) is the variable influencing SJR salmon production, and that increasing flow level into the Delta during the spring months results in substantially increased salmon production.

AR 00212423-24 (footnotes omitted)(emphasis added).[25] Although the

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[25] Contrary to Export Plaintiffs' assertion that ocean conditions are the primary driver of salmonid abundance, the CDFG report concludes ocean conditions are far less influential than spring flows:

> Ocean Harvest
>
> It has also long been postulated that ocean harvest is a controlling influence upon long-term in-river salmon escapement population trends in the SJR. However, comparing the Central Valley Harvest Index to Sacramento and San Joaquin River salmon escapements (Figures 25) suggests that ocean harvest is not a variable influencing the long-term trend in SJR salmon escapement. Unlike in the Sacramento River basin, no noticeable increase in SJR salmon escapement occurred when substantial changes in ocean sport and commercial fish regulations restricted ocean harvest in recent years. Additionally, regressing the Central Valley Harvest Index against annual SJR escapement produces a weak, but statistically significant, regression correlation (Figure 26). The relationships depicted in Figure 25 and 26 suggest that

CDFG report supports Mr. Cavallo's assessment that flows are the primary driver of salmon abundance in the SJR, the report acknowledges that as the export:flow ratio "decreases" (i.e., as the flow:export ratio increases) escapement and cohort production increases. This supports NMFS's use of a flow:export ratio. NMFS's minimization of the CDFG study was scientifically undesireable, but the law does not prevent it, by extending discretion to be mistaken. A candid appraisal of the true effect of flows, without masking the lack of significance in a flow:export ratio, would be welcome.

(d) Delta Action 8 Studies.

The BiOp considered data from the so-called "Delta Action 8 studies," which compared the relative survival rates of coded-wire tagged salmon released at (a) Ryde on the Sacramento River and (b) Georgiana Slough, a channel that splits off of the Sacramento River at Walnut Grove and leads to the interior Delta, joining the South Fork of the Mokelumne River just before it meets the San Joaquin River. The 2010 PI Decision discussed NMFS's treatment and critiques of these studies in detail:

> Evaluating the data from the Delta Action 8 studies, Newman (2008) first explained that there was a high level of environmental variation in the data. [3/30/10 Tr.] at 78:18-23. Dr. Newman performed further analysis to reduce

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factors other than ocean harvest, such as in-Delta or in-river conditions, are controlling the long-term SJR salmon escapement trend. With Delta condition influence upon long term SJR escapement trend being determined by Delta inflow, which in turn is largely controlled by east-side SJR tributary flow21, the focus shifts to in-river, specifically in east-side SJR tributary, conditions.

AR 00212424-25 (footnotes omitted).

the amount of environmental variation and subsequently found a 98% probability that a negative relationship between exports and survival is present. *Id*. at 79:5-7. Mr. Stuart stated the significance of Newman's finding is that as exports increased, survival decreases for those salmonid smolts that are moving down into the San Joaquin River, where they would be exposed to the influences of the export pumps. 4/2/10 Tr. 32:8-34:12. For those fish released into Georgiana Slough, survival was better when exports were lower.

This study is relevant to assessing the impacts of export pumping on fish migrating through the San Joaquin River, because fish released into Georgiana Slough must exit into the San Joaquin River, where they are subject to the influence of the pumps. 3/31/10 Tr. 76:20-23. The Georgiana Slough fish share a common migratory pathway with fish that exit the San Joaquin River basin. *Id*. at 76:24-77:6. Regardless of their origin, once the fish are in this common migratory pathway, they are subject to the same hydraulic conditions. *Id*. at 78:1-17.

Mr. Cavallo stated that his interpretation of the Newman (2008) study is that there is a weak relationship between exports and survival in the interior Delta, but conceded that there was some relationship. 4/1/10 Tr. 98:24-99:4. Mr. Stuart testified that Newman's studies are the best available and the fact that Newman could find a relationship given the considerable amount of "environmental noise" and the very low signal to noise ratio "shows that the relationship is probably very real." *Id*. at 159:6-10. Whether this opinion is entitled to weight is disputed by Plaintiffs.

A September 26, 2008 paper prepared by Dr. Newman with Patricia L. Brandes entitled "Hierarchical Modeling of Juvenile Chinook Salmon Survival as A Function of Sacramento-San Joaquin Delta Water Exports" ("Newman and Brandes 2008") examined the Delta Action 8 data concerning the relative survival rates for Ryde and Georgiana Slough releases and declared: what "we cannot conclude is that exports are the cause of this lower relative survival." 4/1/10 Tr. 67:20-23 (emphasis added); DWR Ex. 507 at 22. Newman and Brandes 2008 reached this conclusion because "the evidence for an association between exports and survival is somewhat weak" and because of the study's inability to randomize export levels within a given outmigration season. 4/1/10 Tr. 68:1-12; DWR Ex. 507 at 22-23. A later version

> of this study, dated 2009, omitted this language from the conclusion. 4/2/10 Tr. 28:2-13.[FN 6]
>
> [FN6] Mr. Stuart explained that although the BiOp cited the 2008 version of the Newman and Brandes study, he actually used the 2009 version to prepare the BiOp and the 2009 paper was in his reference list. He does not know why the BiOp used the 2008 citation. 4/2/10 Tr. 28:2-13
>
> The Delta Action 8 studies seek to relate to exports survival of juvenile salmonids and steelhead passing through the interior Delta from the San Joaquin River basin. These studies show a negative relationship, although admittedly weak, between export levels and survival for fish passing through this area of the Delta.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1134-35 (emphasis added).

DWR again challenges NMFS's reliance on Newman's review of the Delta Action 8 studies to demonstrate that increasing exports will negatively affect salmonids migrating to the ocean through the San Joaquin River and its tributaries. Mr. Cavallo opines that it is inappropriate to rely on the Delta Action 8 studies to reach conclusions about San Joaquin basin salmonids. Cavallo Decl., Doc. 452 at ¶¶ 19-25. He also opines that the overall effect even on migrating salmon smolts in the Sacramento River is relatively small. *Id.* at ¶ 23. NMFS acknowledged the limitations of these studies in the BiOp, yet relies on them to support Action IV.2.1.

The Delta Action 8 studies marginally support Action IV.2.1. Newman's analysis of the Delta Action 8 studies revealed that for those fish passing through Georgiana slough and the interior Delta, survival was negatively impacted by exports. Those fish share a common migratory pathway with all of the fish exiting the San Joaquin

Basin. Fourth Stuart Decl., Doc. 485 at ¶¶ 28-29. It continues to be marginal logic to apply the admittedly weak correlative results of Newman's analysis to San Joaquin salmonids. Mr. Cavallo's criticism that Georgiana Slough, which is not a tidally influenced watercourse and which never experiences reverse flows, is distinct from the SJR, which is tidally influenced and regularly experiences reverse flows, Cavallo Reply Decl., Doc. 497 at ¶ 55, does not abrogate the use of Delta 8 studies. Once fish exit Georgiana Slough, they must travel into the Mokelumne River system and the lower SJR, where they are influenced by tidal movements and exports. Fourth Stuart Decl., Doc. 485 at ¶ 28. Mr. Cavallo's criticisms represent another dispute among experts, to which the agency is due deference, even recognizing that DWR and Mr. Cavallo have no apparent incentive to reach objective opinions contrary to NMFS, while Mr. Stuart makes every call in favor of the species, no matter how questionable the basis.

(3) Treatment of Data Related to the Use of Bubble Curtains at HORB.

Export Plaintiffs argue that NMFS ignored record evidence demonstrating the effectiveness of non-physical barriers, such as bubble curtains, which use sound, lights, and air bubbles, to guide fish. Doc. 431 at 91. A May 18, 2009 transmittal of "preliminary data" from Reclamation Biologist Dr. Mark Bowen showed that a bubble curtain kept a substantial percentage of fish in the San Joaquin River, rather than allowing them to move into the Old River toward the pumps. AR 00093348. Export Plaintiffs' contention that NMFS did not

consider this data in developing Action IV.2.1 is incorrect. NMFS considered Dr. Bowen's preliminary data, Fourth Stuart Decl., Doc. 485 at ¶ 91, and recognized Dr. Bowen's warning that the results were preliminary and was "NOT to be cited!" AR 00093348 (emphasis and punctuation in original). Export Plaintiffs' objection on this ground is not valid.

b. Does the Record Support the Specific Flow/Export Ratios Imposed?

The 2010 PI Decision discussed NMFS's rationale for the 4:1 Ratio:

> NMFS looked at the VAMP data to develop the ratio.
>
> > Current VAMP studies have ratios of flow to exports clustered around 2:1, which have provided low survival indices for upstream releases compared to downstream releases, particularly in recent years. Studies which would have had higher flows (i.e., 7,000 cfs) to export (1,500 cfs) ratios were not conducted, since the necessary environmental conditions to implement this part of the study protocol never occurred. Recent conditions in which high flows did occur in the San Joaquin River basin and which would have given flow to export ratios greater than 3:1 in 2005 and 10:1 in 2006 were confounded by poor ocean conditions during the smolts entry into the marine environment, and returning adult fall-run Chinook salmon escapement numbers from these brood years were very low (brood years 2004, 2005 which returned in 2007 and 2008). From the available data, including the information contained in figures 10 and 11, flow to export ratios should be at least 2:1 and preferably higher to increase survival and abundance. In light of these factors, NMFS initially developed flow to export ratios of 4:1 for wet, above normal, below normal, and dry years, based on the minimum export level of 1,500 cfs and a targeted minimum Vernalis flow of 6,000 cfs. Flows in critically dry years were targeted to be a minimum 3,000 cfs, which gives a flow to export ratio of 2:1 when exports are targeted to be 1,500 cfs.

> BiOp App. 5 at 22-23 (emphasis added). The feasibility and water supply implications of implementing such flow versus export ratios were then examined through computer modeling. *Id.* at 24-68. The BiOp reasoned that a 2:1 ratio was insufficient because the VAMP studies demonstrated low survival rates at that ratio, and that higher ratios would be "prefera[ble]" to increase survival and abundance. Yet, without any biological explanation, the BiOp chose to impose a 1,500 cfs limit when flows at Vernalis are lower than 6,000 cfs, and a ratio of 4:1 (as opposed to 2.5:1, or 3:1, or even 5:1 or higher) when Vernalis flows are between 6,000 cfs and 21,750 cfs. *Id.* at 71-72.
>
> The absence of explanation and analysis for adoption of these limits uses no science, let alone the best available and is simply indefensible.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1135-36 (emphasis added) (footnote omitted).

The PI Decision addressed the Phase I flow:export ratio, which operated through May 31, 2011. Phase II, which will control operations starting next spring (from April 1 through May 31), imposes the following flow:export ratios:

San Joaquin Valley Classification	Vernalis flow (cfs): CVP/SWP combined export ratio
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750.

BiOp at 643-44.

Defendant-Intervenors offer the following record-based justification for these ratios:

> NMFS explained the rationale for the 2:1 flow/export ratio in dry years as follows:

> Studies identify increased flows as a factor that increases survival of tagged Chinook salmon smolts. To date, most VAMP experiments have utilized San Joaquin River flows to export pumping ratios of approximately 2:1. Survival to Chipps Island of smolts released upstream has been relatively low under these conditions. Historical data indicates that high San Joaquin River flows in the spring result in higher survival of outmigrating Chinook salmon smolts and greater adult returns 2.5 year later (Kjelson *et al.* 1981, Kjelson and Brandes 1989, USFWS 1995) and that when the ratio between spring flows and exports increase, Chinook salmon production increases (CDFG 2005, SJRGA 2007).

NMFS 00106725 (BO at 645) (emphasis added); *see also* NMFS 00107220-21 (BO, App. 5, at 74-75). Figure 11 in Appendix 5 of the BiOp depicts data of flow/export ratios over a 50 year period (1951 to 2003) and reveals that increasing the flow/export ratio was positively correlated with increased escapement of fall-run Chinook salmon 2 1/2 years later. *See* NMFS 00107166-67 (BO, App. 5, at 21-22).

The BiOp's rationale for the 4:1 flow/export ratio is likewise clearly set forth and logical:

> The data from the ongoing VAMP experiments provided useful information in developing the ratio. Current VAMP studies have ratios of flow to exports clustered around 2:1, which have provided low survival indices for upstream releases compared to downstream releases, particularly in recent years. Studies which would have had higher flow (i.e., 7,000 cfs) to export (1,500 cfs) ratios were not conducted, since the necessary environmental conditions to implement this part of the study protocol never occurred.

NMFS 00107168 (BO, App. 5, at 22). NMFS went on to explain that:

> From the available data, ... flow to export ratios should be at least 2:1 and preferably higher to increase survival and abundance. In light of these factors, NMFS initially developed flow to export ratios of 4:1 for wet, above normal, below normal, and dry years, based on the minimum export level of 1,500 cfs and a targeted minimum Vernalis flow of 6,000 cfs. Flows in critically dry years were targeted to be a

> minimum 3,000 cfs which gives a flow to export ratio of 2:1 when exports are targeted to be 1,500 cfs.

Id. (emphasis added). These flow and export levels were then assessed through computer modeling. *Id.* *See* NMFS 00107169-00107214 (BO, App. 5, at 23-68).

NMFS acknowledged and responded to DWR's objections to Action IV.2.1: "Both the Bureau of Reclamation and DWR have strong initial opposition to the proposed RPA. DWR has indicated that the RPA is unfeasible as it [is] currently written. They have proposed alternative actions that NMFS has investigated." NMFS 00107214 (App. 5 at 68). Among the alternative proposals made by DWR was "real time monitoring at Mossdale utilizing additional Kodiak trawling." NMFS responded, reasonably, by stating that:

> [R]ecoveries of steelhead in the Mossdale trawl are a rare event and in many years only a handful of fish are recovered. Given these rare recoveries of fish, an appropriate trigger to initiate flow increase or export reductions in a timely manner to protect outmigrating fish would be difficult to determine.... Therefore, what parameters would DWR suggest to indicate when the pulse of steelhead is exiting the system?

NMFS 00107214 (BO, App. 5, at 68).

The analysis discussed above amply demonstrates that, rather than base Action IV.2.1 solely on feasibility concerns, as Export Plaintiffs incorrectly argue, see Export Br. at 94-96, NMFS used the VAMP fish experiments as a starting point for the agency's analysis of a flow/export ratio. *See* NMFS 00107168 (BO, App. 5, at 22). The results of those VAMP studies established that a 2:1 ratio (involving a 1,500 cfs export limit) resulted in "low survival indices," and that a larger ratio was preferable when possible to "increase survival" and adequately protect the species. Id. After modeling results showed that it would be difficult to increase this ratio in dry years, NMFS reasonably set the Phase II ratios at 1:1 for critically dry years and 2:1 for dry years. NMFS 00107219 (BO, App. 5, at 73). In below normal and above normal years, however, NMFS reasonably concluded that more water would be available to meet the more protective ratios, thus allowing a 3:1 ratio in below normal years and a 4:1 ratio in above normal years. *Id.*

In its PI ruling, this Court questioned whether Action

IV.2.1 was "protective enough" or whether a "5:1 or higher" ratio was necessary. PI Findings, CoL ¶ 51; id. FoF ¶ 97. As NMFS explained in Appendix 5 of the BiOp, there are no conclusive studies of flow/export ratios greater than 2:1, but the best available data supports a minimum feasible flow of 6,000 cfs in most years, along with a ratio somewhat higher than the historically tested 2:1 ratio, which had proved insufficiently protective as discussed above. See NMFS 00107164-68 (BO, App. 5, at 18-22). Specifically, the 6,000 cfs target minimum flow was determined based on (1) water reasonably available based on historical flow patterns since 1922; and (2) flow-to-escapement relationships indicating that flows over 5,000 to 6,000 cfs "were required to move into the linear phase of increasing fish escapement." NMFS 00107167-68 (BO, App. 5, at 21-22). Unless NMFS reduced exports to even less than 1,500 cfs – the minimum believed necessary to protect human health and safety – simple math reveals that it would be impossible to achieve a 5:1 or higher ratio, assuming 6,000 cfs as the target minimum flow.

As to whether a less restrictive ratio (e.g., 3:1) was biologically appropriate, NMFS did adopt a 3:1 ratio for below normal years. Only in "above normal" or "wet" years is a 4:1 ratio required. Given the parameters for a flow/export ratio that could feasibly be implemented using a 6,000 cfs target for flows – somewhere between 2:1 and 4:1 – and the lack of data on any of the ratios in between, NMFS reasonably adopted a sliding scale that allows the absolute minimum ratio during drought conditions but increases protections for species when it is feasible to do so, as determined by hydrological conditions.

Of course, NMFS cannot prove with absolute certainty that the 4:1 ratio is protective enough for the species. The existing data simply does allow it. But, given the record evidence of harm to salmon and the need to modify the flow/export ratio, the best available science standard does not require that NMFS stand by and do nothing, paralyzed by a lack of perfect data. To the contrary, NMFS had to act and reasonably exercised its expertise by adopting a flow/export ratio that is both feasible and more protective of the species than the status quo. *See Greenpeace Action*, 14 F.3d at 1337 (upholding biological opinion even though FWS admitted that it was "uncertain about the effectiveness of its management measures" because it "premised these measures on a reasonable evaluation of available data, not on pure speculation").

> Thus, rather than base its decision on "no evidence," as was the case in Pacific Coast I, here NMFS's conclusions are explicitly based on scientific evidence, although some of that data may be "less than conclusive." 426 F.3d at 1094. As acknowledged in Pacific Coast I, this is reasonable and consistent with the ESA. Accordingly, Defendant-Intervenors respectfully urge the Court to reconsider and reverse its preliminary finding that NMFS failed to articulate a reasonable basis for RPA Action IV.2.1. *See* PI Findings, FoF ¶¶ 97, 98; CoL ¶¶ 50, 51.

Doc. 484 at 68-71.

This explanation for the basis for the ratios imposed by Action IV.2.1 is supported by record references, which now explain in part NMFS's choice of ratios, aided by hindsight and judicial review. This is another close call. DWR opposes the flow ratings as infeasible and arguably unnecessary. NMFS uses VAMP flow data to corroborate its position that a 2:1 ratio is insufficiently protective. It justifies the use of a 3:1 ratio when possible (e.g., in below normal years) as necessarily more protective than a 2:1 ratio. The consequences of imposing a 4:1 ratio in above normal and wet years demand a clearer explanation of NMFS's rationale for imposing a 4:1 ratio, rather than a 3:1 ratio in above normal and wet years. The ESA Handbook requires "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added).[26] This is not to be done by

[26] Plaintiffs repeatedly assert that NMFS was required to articulate in the BiOp how and provide supporting evidence demonstrating that each RPA action "will avoid jeopardy to the continued existence of a listed species." Doc. 431 at 92, 101. This suggests a requirement that each individual RPA action must be designed to avoid jeopardy. The requirement is more subtle. The Handbook requires each aspect be an "essential" component of an overall RPA designed to avoid jeopardy and

attorneys, post hoc, in litigation. The importance of this requirement is heightened in light of the weak (arguably equivocal) evidence supporting the imposition of any ratios at all.[27]

Plaintiffs' and DWR's challenge to Action IV.2.1 is valid and their MSJ is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. Although there is marginal record support for the imposition of some form of flow:export ratio, the Action must be remanded for further explanation of the necessity of a 4:1 ratios in above normal and wet years.

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adverse modification. Although each element need not achieve avoidance on its own, Federal Defendants incorrectly assert that "the Court's task here is not to dissect and reanalyze this RPA bit by bit, but analyze the overall management scheme proposed by the RPA and determine whether NMFS acted arbitrarily and capriciously in concluding that the RPA, in its entirety, was necessary to avoid the likelihood of jeopardizing the continued existence of the multiple species at issue." Doc. 477-1 at 71. In fact, the Handbook requires an action-by-action analysis. NMFS must thoroughly explain how "each" component of the RPA is "essential." While the Handbook is not deserving of Chevron deference, *N. Cal. River Watch v. Wilcox*, 633 F.3d 766, 778-79 (9th Cir. 2011), as its purpose is to provide "information and guidance," its text is routinely cited as NMFS's and FWS's interpretation of the ESA, entitled to at least *Skidmore* deference, *Az. Cattle Growers Ass'n v. Salazar*, 606 F.3d 1160, 1165 (9th Cir. 2010). In at least one case, the Secretary of the Interior argued that the Handbook was not binding on the consulting agencies. *Nat'l Wildlife Fed'n v. Babbitt, 128 F. Supp. 2d 1274*, 1292 (E.D. Cal. 2000). But no such suggestion has been made here, nor is the agency's alternative interpretation that it may omit specific justification of each RPA action reasonable. "Although interpretations contained in agency manuals and comments are not entitled to the highest level of deference, a court may nevertheless defer to an agency's interpretation of its own regulation, depending upon 'the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control.'" *Medina County Envt'l Action Ass'n v. Surface Transp. Bd.*, 602 F.3d 687, 700-701 (5th Cir. 2010) (quoting *United States v. Mead Corp.*, 533 U.S. 218, 227-30 (2001)). Applying this standard, the Fifth Circuit concluded that an interpretation contained in the Handbook was entitled to deference. *Id.* at 701.

[27] NMFS is entitled to deference in its interpretation and application of the body of relevant science, most of which is equivocal on the issue, and had some basis to reach the conclusion that some form of flow:export ratio limitation should be imposed. It is as apparent that the record contains no strong evidence that a flow:export ratio limitation will improve salmonid survival.

2. RPA Action IV.2.3.

Action IV.2.3 operates from January 1 through June 15 or until the average daily water temperature at Mossdale is greater than 72° F, and limits OMR flows to no more negative than -2,500 to -5,000 cfs, depending on juvenile entrainment levels. BiOp at 648-52. At the first level of increased juvenile loss, exports must be reduced to achieve an average net flow of -3,500 cfs for a minimum of five days, and at the second level, a more positive OMR average of -2,500 cfs must be achieved for at least five days. *Id.* For each trigger, OMR averages can return to -5,000 cfs only after three consecutive days of not meeting the higher-density juvenile loss trigger. *Id.*

Action IV.2.3 is meant to:

> **[r]educe the vulnerability of emigrating juvenile winter-run, yearling spring-run, and CV steelhead within the lower Sacramento and San Joaquin rivers to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta. Enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the mainstem of the San Joaquin River for emigrating fish, including greater net downstream flows.**

***Id.* at 648.**

NMFS utilized several sources of data to determine that export flow limitations would achieve the objectives of RPA Action IV.2.3, including the relationship between OMR flows and salvage, particle tracking model simulations, and other studies evaluating survival of fish within the central and southern Delta. Export Plaintiffs and DWR challenge the scientific basis for NMFS's determination that an export limitation should be part of the RPA. Export Plaintiffs' general

arguments largely overlap with and incorporate the specific arguments presented in DWR's briefs, this discussion focuses on DWR's briefs.

a. Challenge to the Use of the Particle Tracking Method.

DWR argues that the record does not support NMFS's use of the Particle Tracking Model ("PTM"). A similar argument was addressed in the 2010 PI Decision, which provides the starting point:

> Plaintiffs' seminal challenge to Action IV.2.3 is that NMFS improperly based its rationale for the Action on outputs from computer model runs utilizing the so-called Particle Tracking Model ("PTM"), which models the flow of inert particles as they move within a flowing body of water.
>
> PTM is a hydrodynamic simulation used to assess the fate of particles, as a function of flow, tides, exports, and other factors. 4/1/10 Tr. 18:12-15; *see also id.* at 143:9-25. NMFS used PTM to assess the effects of different OMR flows on the movement of neutrally buoyant particles injected at nine different locations in the Delta. Gov't Salmon Ex. 23 at 2; BiOp at 364-66. The 2009 Salmonid BiOp states that "NMFS uses the findings of PTM simulations to look at the eventual fate of objects in the river over a defined period of time from a given point of origin in the system." BiOp at 366. According to the BiOp, "PTM data can be useful to indicate the magnitude of the net movement of water through the channel after the junction split (and the route selected by the fish), and thus can be used to infer the probable fate of salmonids that are advected into these channels during their migration." *Id.* at 367.
>
> Mr. Cavallo opined that PTM data are not useful to infer the probable fate of salmonids because, in contrast to PTM particles, which have no behavior characteristics, fish have behavior, swim quickly, and have a destination in mind. 4/1/10 Tr. 20:14 – 21:5. Mr. Cramer explained that "[j]uvenile salmonids are strong swimmers whose movements are determined by a wide variety of factors varying with species, size, developmental state, season, time of day, and water temperature, as well as relative hydraulic conditions in a channel. Unlike passive particles, juveniles can and do swim against significant currents." SLDMWA Ex. 120 at ¶6. To illustrate the problems with PTM, Mr. Stuart compared PTM simulations to actual data from mark-recapture

studies of Chinook salmon. This comparison demonstrated that salmon move approximately 3.5 times faster though the water than neutrally buoyant particles and would arrive at Chipps Island in a considerably shorter time frame. 4/1/10 Tr. 37:13 – 38:4.

This was a concern expressed in other studies by other experts. For example, the BiOp relied upon Wim J. Kimmerer and Matthew Nobriga's report entitled "Investigating Particle Transport and Fate in the Sacramento-San Joaquin Delta Using a Particle Tracking Model" ("Kimmerer and Nobriga 2008"). BiOp 105 at 380-381; Gov't Salmon Ex. 1 at ¶4; Gov't Salmon Ex. 4 at ¶8. Kimmerer and Nobriga 2008 disclaims: "[w]e do not claim that the specific results presented here represent actual movements of salmon; rather, these results indicate what factors may or may not be important in determining how salmon smolts may move through the Delta." DWR Ex. 501 at 18.

DWR expressed similar concerns in an email to NMFS dated April 20, 2009 regarding the draft 2009 Salmonid BiOp, asserting that NMFS improperly applied the PTM results in determining the eventual fate of salmonids. Attachment 1 to DWR's comments is a comparison of the results of an experimental release of coded wire tagged salmon in the San Joaquin River under known hydrodynamic conditions with a PTM simulation under identical conditions. 4/1/10 Tr. 32:19-33:8. These results indicate that under low flow conditions, the coded wire tag salmon reached the end location of Chipps Island long before the arrival of most of the PTM particles. The PTM results only partially corresponded with the coded wire tag results under high flow conditions. *Id.* at 34:3-35:18; DWR Ex. 502 at AR 00086765, AR 00086767.

NMFS recognized the limitations of applying the PTM model simulation to salmonids. 4/1/10 Tr. 144:2-8. There were discussions with DWR concerning this issue during the consultation process. *Id.* at 144:9-11. In discussions between DWR and NMFS, NMFS indicated it was using the PTM to evaluate water movement and the potential vulnerability to particle entrainment from various locations in the Delta. *Id.* at 144:13-19. NMFS was explicit that it was not using PTM to predict exactly how fish were moving within these same channels, but that the information gleaned from PTM about water movement through the Delta could provide information on vulnerability to entrainment. *Id.* at 144:19-25.

DWR's expert, Mr. Cavallo, agrees with the BiOp that PTM data can be useful to indicate the magnitude of the net movement of water through a channel after a junction split. *Id.* at 20:21-23; BiOp at 367.

Mr. Cavallo also agrees that PTM results may be informative with regard to salmon movement. 4/1/10 Tr. 28:21-25. Mr. Cavallo stated that under the appropriate conditions, PTM simulations would be an appropriate tool to describe fish movement in discharge-driven portions of the Delta watershed. *Id.* at 86:8-10. Mr. Cavallo stated that the Kimmerer and Nobriga PTM study shows that "flow has a big effect on the path that water takes through the Delta," and that fish in a riverine system will tend to go with the flow. *Id.* at 30:11-15.

Mr. Cavallo's time-step critique of the PTM simulations used in the BiOp is unsupported.

Mr. Cavallo opines that the correct approach to PTM simulations is [] to ensure that the time horizon used in the model was consistent with the time horizon of the fish being studied. *Id.* at 25:6-11. Mr. Cavallo interpreted particular graphs in the biological opinion to indicate that NMFS used a 31-day time horizon in its PTM simulations, *id.* at 26:6-16, and opined that this time horizon was too long and would skew the results of the simulation, *id.* at 27:7-11.

The PTM simulations NMFS used were run by DWR. *Id.* at 86:14-15; 146:9-10. These simulations included four model runs for the months of February through June, using both [a] wet year [and] a dry year, and varied whether HORB was installed during the April/May period. *Id.* at 146:14-24, 147:4-6. Three different OMR flows were examined: -3,000 cfs, -2,500 cfs, and -1,250 cfs. *Id.* at 147:15-18. During that simulation, the particles actually were tracked every five days for the first 30 days. *Id.* at 147:1-4; Gov't Salmon Ex. 23 at 2. Mr. Cavallo was unsure that the particles were tracked every five days, nor did he review Mr. Stuart's memorandum explaining the PTM simulation results. 4/1/10 Tr. 87:11-13.

Mr. Cavallo's critique of the choice of injection sites is weakened by his agreement that at least two of the particle injection sites modeled by DWR, at NMFS' request, were useful in evaluating the movement of water particles at

channel junctions. *Id.* at 90:17-91:16. NMFS selected the particular injection sites in order to model the vulnerability of particles within the waterways of the south Delta. *Id.* at 147:22-149:13.

NMFS' PTM simulation also showed that, as export levels increase, OMR levels became more negative. 4/1/10 Tr. 150:21-21. Mr. Cavallo stated that exports are highly correlated with OMR flows. 4/1/10 Tr. 40:25-41:2.

NMFS' PTM simulation showed that, as exports increased, the percentage of particles entrained at the export facilities increased, particularly from the Mossdale and Union Island sites and stations 912, 815, 902, and 915. 4/1/10 Tr. 150:22-25; *see* Gov't Salmon Ex. 18 (map of injection sites). The proximity of the injection point to the export facilities led to a much higher level of particle entrainment. 4/1/10 Tr. 151:1-3. As exports increased, the rate at which the particles arrived at the export facilities increased. *Id.* at 151:3-5; *see also* BiOp at 365-66; 4/1/10 Tr. 151:21-153:9 (explaining graphs in biological opinion).

Despite the statement in the Kimmerer and Nobriga study that they could not establish a "zone of influence" of exports, Mr. Stuart testified that the shorter time horizon used in NMFS' PTM simulations distinguished it from the Kimmerer and Nobriga simulations, which utilized a 90-day period. 4/2/10 Tr. 23:21-24:2.

Mr. Stuart testified that there is no precisely defined boundary for the influence of the exports, and that the boundary of influence depends on river flow, tides, and the magnitude of the exports. *Id.* at 29:4-9. If there are extremely low-flow conditions and high exports, the extent of the exports could travel considerably farther downstream, even towards the junction of the Sacramento and San Joaquin Rivers. *Id.* at 29:9-13. Typically, according to Mr. Stuart, the boundary would be close to station 815 at the confluence of Georgiana Slough and the Mokelumne River or slightly farther downstream. *Id.* at 29:13-15. As the BiOp explains:

> The data output for the PTM simulation of particles injected at the confluence of the Mokelumne River and the San Joaquin River (Station 815) indicate that as net OMR flow increases southwards from -2,500 to -3,500 cfs, the risk of particle entrainment nearly doubles from 10 percent to 20 percent, and quadruples to 40

> percent at -5,000 cfs. At flows more negative than -5,000 cfs, the risk of entrainment increases at an even greater rate, reaching approximately 90 percent at -7,000 cfs. Even if salmonids do not behave exactly as neutrally buoyant particles, the risk of entrainment escalates considerably with increasing exports, as represented by the net OMR flows. The logical conclusion is that as OMR reverse flows increase, risk of entrainment into the channels of the South Delta is increased. Conversely, the risk of entrainment into the channels of the South delta is reduced when exports are lower and the net flow in the OMR channels is more positive -- that is, in the direction of the natural flow toward the ocean.
>
> BiOp at 652.
>
> This is a dispute among scientists. While DWR criticizes PTM modeling, Stuart and NMFS recognized its limitations and found PTM studies helpful to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), particle entrainment increases from 10% at -2,500 cfs, to 20% at -3,500 cfs, to 40% at -5,000 cfs, and 90% at -7,000 cfs. NMFS, through Mr. Stuart, took into account inherent differences in the movement of neutrally buoyant particles and their speed and direction of travel. Administrative law requires deference to the Agency. Additional record analysis is necessary to determine the extent of support for NMFS's additional opinion that exports affect salmonid survival.

Consol. Salmonid Cases, 713 F. Supp. 2d at, 1138-41. DWR raises several additional arguments regarding the use of PTM.

(1) DWR's Argument that NMFS Failed to Address PTM Limitations Described by Kimmerer and Nobriga.

DWR argues that NMFS did not adequately address PTM limitations described in Kimmerer and Nobriga's 2008 article "Investigating Particle Transport and Fate in the Sacramento San Joaquin Delta using a Particle Tracking Model." AR 00122246-71.

First, Kimmerer and Nobriga cautioned that PTM "was a useful

predictor of entrainment probability if the model were allowed to run long enough to resolve particles' ultimate fate" and that "model accuracy varies depending on the length of the simulation." AR 00112246, 00122250. DWR argues that NMFS disregarded these "words of caution." Doc. 446-1 at 20. This is inaccurate. NMFS convened a group of State and federal scientists to discuss PTM simulations, including DWR representatives, who raised some of the same criticisms asserted here. AR 00106021-25 (June 3, 2009 Memo Re: PTM "results for [OMR] flow manipulation" ("PTM Memo")). NMFS considered the length of simulation at multiple meetings, AR 00106021-22 (PTM Memo discussing meetings from January through March 2009 and durations of PTM tracking); AR 00061290-91 (communication between Jeffrey Stuart and Tracy Hinojosa at DWR regarding PTM simulations), AR 00060023-24 (agenda items for discussion at "Modeling work group), and addressed concerns raised in the PTM Memo, *see* AR 00105025-27.

Second, DWR highlights that Kimmerer and Nobriga (2008) notes that the PTM model "has not been calibrated." AR 00122262. DWR argues that NMFS should not have used an un-calibrated model. Doc. 446-1 at 20. This ignores the fact that DWR and others have in fact performed validation and calibration on the PTM to ensure that it accurately depicts hydrodynamics. Fourth Stuart Decl., Doc. 485 at ¶ 47.

Finally DWR argues that NMFS's reliance on this study to "analyz[e] the potential 'zone of effects' for entraining emigrating

juvenile and smolting salmonids," BiOp at 361, conflicts with the recommendations of Kimmerer and Nobriga, Doc. 446-1 at 21. Specifically, Kimmerer and Nobriga stated: "[w]e are ... not inclined to define a 'zone of influence' of the pumps on the basis of our results." AR 00122263. The entire paragraph goes on:

> A consequence of this is that simple questions (e.g., what proportion of particles are entrained under a given set of conditions) have no clear answer. Instead, the answer depends on the time horizon, which in turn depends on the overall flow conditions and the site of the release. We are, furthermore, not inclined to define a "zone of influence" of the pumps on the basis of our results, since the probability of entrainment depends on time horizon which, in many cases, is too long to be useful for analyzing the movements of larval fish. By the end of the modeled time period, the fish would already have metamorphosed, and their behavior would have become more complex.

AR 00122263. Kimmerer and Nobriga (2008) addresses both larval delta smelt and juvenile salmonids. Their reluctance to define a "zone of influence" is focused on the difficulties posed by modeling larval delta smelt, which may metamorphose to a more complex state within the time horizon of the PTM simulation. This apologetic does not suggest there are not problems with using PTM to define a of zone of influence, it is simply a statement that endeavors to explain uncertainty. Although NMFS's interpretation and use of Kimmerer and Nobriga (2008) was not accurate, again it is the agency's spin on the science. It is not unlawfully erroneous.

(2) DWR's Argument that NMFS Failed to Address Evidence in the Record Critical of the Use of PTM to Explain Salmonid Behavior.

DWR revisits the issue of whether NMFS gave adequate

consideration to record evidence critical of the use of PTM to explain salmonid behavior. DWR specifically cites a 2001 article by Baker and Morhardt, AR 00108384-403, and an analysis conducted by DWR included in DWR's April 24, 2009 comments on the draft BiOp. *See* Doc. 446-1 at 22-23. Baker and Morhardt (2001) demonstrated that the fate of particles in the PTM was different from actual salmon behavior. AR 00108394 ("for the hydraulic simulations available to us ... 77 % of the tracer [PTM] particles ended up at the export pumps, while only 13% of the smolts arrived there"). Likewise, the DWR (2009) analysis concluded there "is no correlation" between coded wire tagged ("CWT") Chinook recoveries and PTM particle behavior. AR 00105430.

These additional studies do not undermine the reasoning of the 2010 PI Decision:

> NMFS recognized the limitations of applying the PTM model simulation to salmonids. 4/1/10 Tr. 144:2-8. There were discussions with DWR concerning this issue during the consultation process. *Id.* at 144:9-11. In discussions between DWR and NMFS, NMFS indicated it was using the PTM to evaluate water movement and the potential vulnerability to particle entrainment from various locations in the Delta. *Id.* at 144:13-19. NMFS was explicit that it was not using PTM to predict exactly how fish were moving within these same channels, but that the information gleaned from PTM about water movement through the Delta could provide information on vulnerability to entrainment. *Id.* at 144:19-25.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1139. DWR has acknowledged that this is a permissible PTM use. It has cast doubt on the efficacy of NMFS's reliance on the PTM, even for this narrow purpose, but has not shown it to be substantially unreasonable.

There is more to DWR's critique. To validly rely on the PTM results to impose management measures designed to aid salmonid survival, the movement of water described by the PTM must be reasonably related to the movement of salmonids. Citing the Baker and Morhardt (2001) study and DWR (2009) comments, Mr. Cavallo opines that this "has been shown to be incorrect." Cavallo Decl., Doc. 452 at ¶ 54.

NMFS justifies reliance on PTM simulations as a proxy for salmonid behavior:

> NMFS uses the findings of the PTM simulations to look at the eventual fate of objects in the river over a defined period of time from a given point of origin in the system. While salmonids and green sturgeon are not "neutrally buoyant particles", they can be represented to some degree by the PTM modeling results. The fish occupy a given body of water in the river and that body of water has eventual fates in the system, as represented by the dispersion of the injected particles. The salmonids have volitional movement within that body of water and react to environmental cues such as tides, water velocity vectors, and net water flow movement within the channel. The eventual fate of that body of water signifies the potential vulnerabilities of fish within that body of water to external physical factors such as export pumping or river inflows. For example, if exports increase, and the eventual fate of the water body indicates that it has a higher probability of entrainment compared to other conditions (i.e., lower export pumping), then NMFS believes that salmonids within that same body of water will also experience a higher probability of entrainment by the export pumping. Conversely, under conditions where the eventual fate of injected particles indicate a high probability of successfully exiting the Delta at Chipps Island, NMFS believes salmonids traveling in the same body of water will have a higher probability of exiting the Delta successfully. Furthermore, conditions which delay movement of particles out of the Delta yet don't result in increased entrainment at the export facilities would indicate conditions that might delay migration through the Delta, which would increase vulnerabilities to predation or contaminant

> exposure. Finally, flow conditions at river channel splits indicate situations where migrating fish must make a "decision" as to which channel to follow. If water is flowing into a given channel, then fish closer to that channel bifurcation are more likely to be influenced by the flow conditions adjacent to the channel opening than fish located farther away from the channel mouth. Burau *et al.* (2007) describes the complexity of these temporal and spatial conditions and their potential influence on salmonid movement. PTM simulations currently do not give the necessary fine scale resolution both temporally (minutes to fractions of hours) and spatially (three dimensional on the scale of meters) to give clear results at these channel splits. Burau states that spatial distribution of fish across the river channel occurs upstream of the channel splits and is dependent "upon the interaction between local hydrodynamic processes (e.g., secondary currents) and subtle behaviors that play out in a Lagrangian reference frame. These spatial structures evolve over fractions of hours to hours. Junction interactions, on the other hand, happen very rapidly, typically within minutes. Thus, route selection may only minimally depend on behavioral responses that occur in the junction, depending to a greater degree on spatial distributions that are created by subtle behavioral responses/interactions to geometry-mediated current structures that occur up-current of a given junction." This description illustrates the complexity of route selection. Based on Burau's explanation, fish upstream of the split are dispersed by the environmental conditions present in the channel into discrete locations across the channel's cross section. The proximity of these locations to the channel mouth is predictive of the risk of diversion into the channel itself. PTM data can be useful to indicate the magnitude of the net movement of water through the channel after the junction split (and the route selected by the fish), and thus can be used to infer the probable fate of salmonids that are advected into these channels during their migrations.

BiOp 366-67. The BiOp does not explain the basis for NMFS's "belief" that salmonids within a body of water with a higher probability of particle entrainment will themselves "also experience a higher probability of entrainment by the export pumping"; its "belief" that salmonids within a body of water "where the eventual fate of injected

particles indicate a high probability of successfully exiting the Delta at Chipps Island" will themselves have a "higher probability of exiting the Delta successfully"; nor its conclusion that conditions which delay movement of particles out of the Delta yet don't result in increased entrainment at the export facilities suggest conditions that might delay migration through the Delta. What support for these conclusions does the record contain?

(3) Salvage Data.

The BiOp relies in part on the plots of juvenile loss versus monthly OMR flows in Figures 6-65 and 6-66 discussed above to link the PTM results to salmonid behavior.

> Based on particle tracking modeling, the Delta smelt work group concluded that net river flows greater than -2000 ± 500 cfs in the Old River and Middle River complex reduced the zone of entrainment so that particles injected into the central Delta at Potato Slough would not be entrained towards the pumps (Kimmerer and Nobriga 2008 op cit. CVP/SWP operations BA). NMFS considers this information useful in analyzing the potential "zone of effects" for entraining emigrating juvenile and smolting salmonids. A similar pattern is observed in material (figures 6-65 and 6-66) provided to NMFS by DWR (Greene 2009). Loss of older juveniles at the CVP and SWP fish collection facilities increase sharply at Old and Middle River flows of approximately -5,000 cfs and depart from the initial slope at flows below this. Given the data derived from the CVP/SWP operations BA Appendix E, flows in Old and Middle River are consistently in excess of the -2000 ± 500 cfs threshold for entrainment (i.e., more upstream flow). Assuming that in the normal (natural) flow patterns in the Delta, juvenile and smolting Chinook salmon and steelhead will use flow as a cue in their movements and will orient to the ambient flow conditions prevailing in the Delta waterways, then upstream flows will carry fish towards the pumps during current operations. General tendencies of the modeling results indicate that Old River and Middle River net flows trend towards greater upstream flow in the near future and future

> conditions, resulting in even more fish carried towards the pumps.

BiOp at 361. The BiOp's reliance on figures 6-66 and 6-66 has been found unlawful. Without scaling for population size, the trends seen in Figures 6-65 and 6-66 are meaningless, because data points indicating greater salvage may simply be the result of a greater absolute number of individuals present in the entire Delta. The number of individuals lost to salvage could go up simply because the volume of water pumped through the salvage facility increases, not because increasing exports causes a greater percentage of the population to make its way toward the salvage facilities than would otherwise be present there.

(4) Other Studies.

In addition to Figures 6-65 and 6-66, NMFS relied on other studies, namely Vogel (2004), Perry & Skalski (2008), Newman (2008), and Newman and Brandes (2009), to conclude that as exports increase, greater numbers of salmonids are drawn into the interior Delta.

(a) Vogel (2004).

The 2010 PI Decision addressed the BiOp's reliance on Vogel (2004):

> The BiOp also relied upon Vogel (2004), which reviewed telemetry-tagging data to investigate fish route selection in the channels leading to the south Delta. See BiOp at 380-81. Based on Vogel's work, the BiOp found that when export levels were reduced and San Joaquin River flows were increased, more fish stayed in the main channel of the San Joaquin River, heading downstream toward the San Francisco Bay. *Id.*

> Mr. Cavallo maintains that Vogel (2004) does not support the conclusion that a reduction in export pumping resulted in the reduction of salmon leaving the mainstem of the San Joaquin River and entering the southern Delta. 4/1/10 Tr. 47:20-24, 49:8-13, 49:25 – 50:4, 50:17-23; DWR Ex. 505. The Vogel (2004) study concluded that the experiments it conducted "could not explain why some fish move off the mainstem of the San Joaquin River into the south Delta channels," noting that "[d]ue to the wide variation in hydrologic conditions" during the course of the experiments, "it was difficult to determine the principal factors affecting fish migration. Based on the limited data from these studies, it may be that a combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary."
> DWR Ex. 505 at 37.
>
> When asked about Vogel's inconclusive results, not discussed in the BiOp, Mr. Stuart admitted that the BiOp's failure to disclose the conclusion was "an oversight on my part," for which he had no explanation. 4/2/10 Tr. 15:4-9.
>
> It was not rational nor scientifically justified for the BiOp to rely on Vogel (2004) for findings the authors themselves refused to make.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1144. Defendant-Intervenors attempt to justify NMFS's reliance on Vogel (2004):

> [T]he paragraph from page 380 of the BiOp (NMFS 00106460) that DWR quotes and claims misstates Vogel (2004) is based not only on the 2004 Vogel study, but also the subsequent VAMP experiments. Vogel did conclude, as DWR states, that: "These [radio-tagged] experiments could not explain why some fish moved off the mainstem San Joaquin River into south Delta channels." NMFS 00217996 (Vogel 2004 at 37). But Vogel also went on to observe that "[b]ased on limited data from these studies, it may be that [a]combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary." *Id.* (emphasis added). According to Vogel, "[m]ore detailed analyses of fish movements in relation to quantitative measures of Delta hydrodynamics such as tidal excursion, net flow over a complete tide cycle, and flow structure at specific channel flow splits ... may provide more definitive conclusions on fish migration behavior." *Id.* Such further studies, according to Vogel, should include "water particle tracking model results in comparison to radio-tagged fish migration data," i*d.* (emphasis added),

> as well as acoustic tagged salmon releases. *Id.* Thus, NMFS's conclusions are based not only on Vogel (2004), but the subsequent PTM and VAMP studies, discussed above, that Vogel and others recommended. And, NMFS has required the acoustic tag studies recommended by Vogel and others in Action IV.2.2.

Doc. 484 at 48-49. Vogel's call for further experiments or statement that he believes reduced exports, in conjunction with other factors, "may be" beneficial to migrating salmonids, does not change the fact that Vogel's own 2004 work does not explain why the fish studied moved off the mainstem San Joaquin. Reliance on this study to demonstrate that that Action IV.2.3's negative OMR flow limitations will reduce the vulnerability of juvenile salmonids to entrainment in the Delta is unreasonable.

(b) Perry and Skalski (2008).

The BiOp also relied upon a 2008 study by Perry and Skalski, which was previously addressed in the 2010 PI Decision:

> The BiOp utilized the Perry and Skalski (2008) study that concluded survival of fish moving into Georgiana Slough and nearby channels was reduced compared to those in the mainstem of the Sacramento River. 4/1/10 Tr. 161:20-162:1. These fish enter a portion of the San Joaquin River that NMFS found to be impacted by exports in its PTM simulation. *Id.* at 162:5-17; 4/2/10 Tr. 18:12-20, 19:22-20:11.
>
> However, Perry and Skalski 2008 noted that "there is limited understanding of how water management actions in the Delta affect population distribution and route-specific survival of juvenile salmon." SDLMWA Ex. 227 at 3. Mr. Cavallo testified that Perry and Skalski 2008 does not provide scientific support for the view that salmonids are lost due to water project-induced alterations to Delta hydrologic conditions. 4/1/10 Tr. 66:5-9.134.
>
> Mr. Stuart admitted that Perry and Skalski 2008 did not address water project impacts on Delta hydrology, fish

> behavior, or the indirect mortality of fish in the central and southern channels of the Delta. Mr. Stuart further admitted that he reached his conclusions regarding water project impacts on Delta hydrology, fish behavior, and indirect salmonid mortality based upon his personal extrapolation from the data contained in Perry and Skalski 2008, and not from any conclusions reached by Perry and Skalski. 4/2/10 Tr. 19:2 – 21:24. However, these personal extrapolations are not documented or otherwise explained in the BiOp or elsewhere in the record.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1143-44.

Mr. Stuart's Fifth Declaration clarifies that the BiOp cited Perry and Skalski (2008) in reference to "the risk that individual salmon smolts face to entrainment into either the channel of the Delta Cross Channel (when it is open) or into the channel of Georgiana Slough as they migrate downstream in the Sacramento River and not to the probability of ending up at the export facilities." Fifth Stuart Decl., Doc. 519 at ¶ 19. The BiOp did not rely on Perry and Skalski to justify its conclusion that the PTM is a valid proxy for salmonids or to demonstrate that exports cause salmonids to move toward the export facilities. Perry and Skalski does not support PTM as a proxy and should not have been cited.

(c) Newman (2008).

Newman (2008), which concluded that salmonids passing through Georgiana slough into the interior delta had slightly reduced survival when exports were higher relative to times when exports were lower, has been discussed. This lends marginal support to NMFSs conclusion that increasing exports negatively impacts salmonids moving through the interior delta.

(d) Newman and Brandes (2009).

DWR cites a 2008 draft of a study by Newman and Brandes analyzing the Delta Action 8 studies, "Hierarchical Modeling of Juvenile Chinook Salmon Survival as a Function of Sacramento-San Joaquin Delta Water Exports." In that draft, discussing the lower rate of survival of smolts traveling through Georgiana slough and the interior delta under high export conditions relative to low export conditions, the authors opined: "what we cannot conclude is that exports are the cause of this lower relative survival." NMFS 00127347. However, that sentence and several following paragraphs were eliminated by Newman and Brandes from the final, published version of the study. *See* AR 00089883. Like Newman (2008), Newman and Brandes (2009) found negative relationships between exports and survival. Fifth Stuart Decl., Doc. 519 at ¶ 33 (citing AR 00089884).

(e) Brandes & McLain (2001).

DWR also cites Brandes and McLain, "Juvenile Chinook Salmon Abundance, Distribution, and Survival in the Sacramento-San Joaquin Estuary" (2001). This study found "mixed results":

> **Results were mixed showing in 1989 and 1990 that survival estimates between Dos Reis and Jersey Point were higher with higher exports whereas in 1991 between Stockton and the mouth of the Mokelumne River (Tables 11 and 12) survival was shown to be lower (0.008 compared to 0.15) when exports were higher. One potential bias in the 1989 and 1990 data is that as mentioned earlier, smolts released at Dos Reis in 1989 were from the Merced River Fish Facility while those released at Jersey Point were from Feather River hatchery. Using different stocks to estimate smolt survival between two locations may introduce bias. In addition, results in 1989 and 1990 also showed that survival indices of the upper**

> Old River groups relative to the Jersey Point groups were also higher during the higher export period, but overall still about half that of the survival of smolts released at Dos Reis (Table 11).

AR 00109602. That the study's authors question the validity of the results from the years showing a positive relationship between exports and survival and do not critique the results from the year showing a negative relationship, lends minimal support to NMFS's conclusion that exports influence salmonid survival.

(f) Kimmerer 2008.

Defendant-Intervenors point to a Kimmerer 2008 that unequivocally found that "[t]he estimated proportion of migrating fish salvaged at the export facilities increased with increasing export flow." AR 00122236. DWR and Export Plaintiffs do not contest this conclusion.

(g) SJRGA 2007

Finally, Defendant-Intervenors point to the San Joaquin River Group Authority ("SJRGA") 2007 review of VAMP data, which found evidence of a negative relationship between exports and survival. *See* AR 00134423 ("The CDRRs [combined differential recovery rates] measured for the first group released in 2006, under low exports, appeared higher than those obtained in 2003-2005 and for the 2006 group released under higher exports and higher temperature.").

This entire record shows that the science is conflicting and often equivocal. Most of the evidence does not show a negative

relationship between levels of exports and salmon survival. It is impossible to discern the effect of exports on salmon behavior from the record. Despite these numerous criticisms, NMFS chose to use PTM as a modeling tool for salmonid behavior. DWR's own staff biologist, Sheila Greene, testified in a related case by declaration that "Given the insufficiency of behavioral data, particle tracking is the best available science to estimate the proportions of juvenile Chinook salmon that emigrate through the Delta." AR 00118803. DWR is bound by this statement. Whether to use PTM modeling then becomes a matter of agency discretion.

b. Justification for the Specific Flow Prescriptions in Action IV.2.3.

Existence of record support for NMFS's reliance on the PTM does not end the inquiry. The BiOp applied the PTM to generate flow prescriptions using the following approach:

> The data output for the PTM simulation of particles injected at the confluence of the Mokelumne River and the San Joaquin River (Station 815) indicate that as net OMR flow increases southwards from -2,500 to -3,500 cfs, the risk of particle entrainment nearly doubles from 10 percent to 20 percent, and quadruples to 40 percent at -5,000 cfs. At flows more negative than -5,000 cfs, the risk of entrainment increases at an even greater rate, reaching approximately 90 percent at -7,000 cfs. Even if salmonids do not behave exactly as neutrally buoyant particles, the risk of entrainment escalates considerably with increasing exports, as represented by the net OMR flows. The logical conclusion is that as OMR reverse flows increase, risk of entrainment into the channels of the South Delta is increased. Conversely, the risk of entrainment into the channels of the South delta is reduced when exports are lower and the net flow in the OMR channels is more positive -- that is, in the direction of the natural flow toward the ocean.

BiOp at 652. Even if the PTM is the best available mechanism for modeling salmonid behavior, NMFS has failed to justify this leap of logic, which in essence assumes that salmonids will be drawn toward the export facilities to the same extent as neutrally buoyant particles. In light of undisputed record evidence discussed above demonstrating the many deficiencies in the PTM and that it is far from a perfect proxy for salmon behavior, NMFS has not provided "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added). Conclusory explanations of the value of RPA actions are insufficient. *PCFFA v. U.S. Bureau of Reclamation*, 426 F.3d 1082, 1093 (9th Cir. 2005).

Plaintiffs' and DWR's motion challenges to Action IV.2.3 is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. There is nominal record support for the imposition of some form of OMR flow restriction, but the Action must be remanded for further explanation of the necessity the specific flow prescriptions imposed, which are derived primarily from PTM simulations, a method that is undisputedly an imperfect predictor of salmon behavior.

3. Action IV.3.

From November 1 through December 31, Action IV.3 restricts combined CVP and SWP exports to 6,000 cfs or 4,000 cfs when certain

salvage thresholds are met. BiOp at 653. The 6,000 cfs export limit is triggered when daily SWP and CVP older juvenile loss density is greater than 8 fish per thousand acre feet ("TAF"), daily loss is greater than 95 fish per day, or the Coleman National Fish Hatchery coded wire tagged late fall-run Chinook salmon ("Coleman CWT fish") or Livingstone Stone National Hatchery coded wire tagged winter-run ("L-S CWT fish") cumulative loss is greater than 0.5%. *Id.* The more restrictive 4,000 cfs export limit is triggered when the daily older juvenile loss density is grater than 15 fish per TAF, daily loss is greater than 120 fish per day, or the Coleman CWT or L-S CTW fish cumulative loss is greater than 0.5%. Either export restriction remains in place for three days, or until daily older juvenile loss density is less than 8 fish per TAF. *Id.* Action IV.3 also establishes an "alert," which signals that export restrictions may need to be altered when either the Knights Landing or Sacramento catch index is greater than 10 fish captured per day from November 1 to February 28, or greater than 15 fish captured per day from March 1 to April 30. *Id.* at 652.

The objective of Action IV.3 is to "[r]educe losses of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon by reducing exports when large numbers of juvenile Chinook salmon are migrating into the upper Delta region, at risk of entrainment into the central and south Delta and then to the export pumps in the following weeks." *Id.*

DWR does not challenge this RPA Action. Export Plaintiffs, however, raise several objections. First, Export Plaintiffs challenge NMFS's underlying assumption for Action IV.3 that "[e]xport pumping changes flow patterns and increases residence time of ... diverted fish in the central Delta, which increases the risk of mortality from [other factors], as well as the likelihood of entrainment at the pumps." *Id.* at 653. They argue that this assumption is not supported by the best available science, reiterating the argument that the studies relied upon by NMFS do not "connect mortality in the interior delta to export levels," and that NMFS's use of PTM studies to show "potential vulnerabilities of fish" is not appropriate. Doc. 431 at 106-108. Although the evidence supporting a survival effect of increased exports weak and disputed, NMFS's conclusion that export pumping negatively impacts salmonid survival has marginal support in the record and is not unlawfully erroneous. The BiOp's related use of PTM as a modeling tool for salmonids is a highly disputed scientific choice, described by DWR as the best available science in at least one application.

Export Plaintiffs also challenge the specific triggers used in Action IV.3, on the grounds that: (1) as was the case with the plots of raw salvage used to justify other Actions, the triggers do not account for the relative size of the various salmonid populations; and (2) "NMFS nowhere explains how it arrived at these thresholds. Doc. 431 at 108-09.

Federal Defendants respond that Plaintiffs' concern that Action IV.3 fails to scale the loss triggers against the population size is "a red herring" because "NMFS did not conclude that Action IV.3 alone is avoiding jeopardy. Rather, the measure simply reflects NMFS's conclusion that it is important to have increased protections when you have more fish at the salvage facilities." Doc. 477-1. This is a total abdication from NMFS's self-imposed requirement that the RPA provide "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added). Federal Defendants cannot impose a complex and burdensome RPA, damaging of other interests, without specifically justifying each of its components. Adoption of Federal Defendants' "trust me" approach would mean that the more complex an RPA, the more obscured it is from judicial review. Each component need not eliminate jeopardy on its own, but that does not excuse NMFS from separately justifying individual Actions.

While there is record explanation for an action designed to prevent large numbers of fish from being killed or harmed at the export pumping facilities, Export Plaintiffs raise serious questions related to the need to scale the triggers to the overall size of the salmonid populations they aim to protect. Given previous findings about the use of raw salvage figures, the best available science calls for an index related to population size, rather than a fixed number. More importantly, even if this were not a problem, Federal Defendants

have entirely failed to provide any record explanation for why the specific triggers were chosen. NMFS must address and correct this failure on remand. Plaintiffs' motion is GRANTED on this issue; Federal Defendants' and Defendant-Intervenors' cross motion is DENIED.

G. Compliance with 50 C.F.R. § 402.02.

ESA section 7(b)(3)(A) provides that, "[i]f jeopardy or adverse modification is found, the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a)(2) of [Section 7] and can be taken by the Federal agency ... in implementing the agency action." *Id.* "Reasonable and prudent alternatives refer to alternative actions identified during formal consultation [1] that can be implemented in a manner consistent with the intended purpose of the action, [2] that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, [3] that is economically and technologically feasible, and [4] 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 (the "four RPA requirements").

NMFS and FWS's joint Consultation Handbook explains that during the formal consultation period, NMFS should "meet or communicate with the action agency ... to gather any additional information necessary to conduct the consultation." Consultation Handbook at 4-6. Among other things, the formal consultation period should be used to

"develop reasonable and prudent alternatives to an action likely to result in jeopardy or adverse modification...." *Id.*

Consultation "should be undertaken cooperatively with the action agency and any applicant, thus allowing the Services to develop a better understanding of direct and indirect effects of a proposed action and any cumulative effects in the action area. Action agencies also have the project expertise necessary to help identify reasonable and prudent alternatives, and reasonable and prudent measures. Other interested parties (including the applicant, and affected State and tribal governments) should also be involved in these discussions.... These cooperative efforts should be documented for the administrative record." *Id.*

The Handbook contains a section on RPAs, which provides as follows:

> Reasonable and prudent alternatives
>
> This section lays out reasonable and prudent alternative actions, if any, that the Services believe the agency or the applicant may take to avoid the likelihood of jeopardy to the species or destruction or adverse modification of designated critical habitat (50 CFR § 402.14(h)(3)). 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. The action agency and the applicant (if any) should be given every opportunity to assist in developing the reasonable and prudent alternatives. Often they are the only ones who can determine if an alternative is within their legal authority and jurisdiction, and if it is economically and technologically feasible.
>
> If adopted by the action agency, the reasonable and prudent alternatives do not undergo subsequent consultation to meet

the requirements of section 7(a)(2). The action agency's acceptance in writing of the Services' reasonable and prudent alternative concludes the consultation process.

Section 7 regulations (50 CFR §402.02) limit reasonable and prudent alternatives to:

- alternatives the Services believe will avoid the likelihood of jeopardy or adverse modification,
- alternatives that can be implemented in a manner consistent with the intended purpose of the action,
- alternatives that can be implemented consistent with the scope of the action agency's legal authority and jurisdiction, and
- alternatives that are economically and technologically feasible.

If the Services conclude that certain alternatives are available that would avoid jeopardy and adverse modification, but such alternatives fail to meet one of the other three elements in the definition of "reasonable and prudent alternative," the Services should document the alternative in the biological opinion to show it was considered during the formal consultation process. This information could prove important during any subsequent proceeding before the Endangered Species Committee (established under section 7(e) of the Act), which reviews requests for exemptions from the requirements of section 7(a)(2).

Although a strong effort should always be made to identify reasonable and prudent alternatives, in some cases, no alternatives are available to avoid jeopardy or adverse modification.

Examples include cases in which the corrective action relies on:

- an alternative not under consideration (e.g., locating a project in uplands instead of requiring a Corps permit to fill a wetland);
- actions of a third party not involved in the proposed action (e.g., only the County, which is not a party to

> the consultation, has the authority to regulate speed limits);
>
> - actions on lands over which the action agency has no jurisdiction or no residual authority to enforce compliance; and
>
> - data not available on which to base an alternative.
>
> In these cases, a statement is included that no reasonable and prudent alternatives are available, along with an explanation. When data are not available to support an alternative, the explanation is that according to the best available scientific and commercial data, there are no reasonable and prudent alternatives to the action undergoing consultation. The Services are committed to working closely with action agencies and applicants in developing reasonable and prudent alternatives. The Services will, in most cases, defer to the action agency's expertise and judgment as to the feasibility of an alternative. When the agency maintains that the alternative is not reasonable or not prudent, the reasoning for its position is to be provided in writing for the administrative record. The Services retain the final decision on which reasonable and prudent alternatives are included in the biological opinion. When necessary, the Services may question the agency's view of the scope of its authorities to implement reasonable and prudent alternatives.

Consultation Handbook, 4-41 - 4-42.

San Luis & Delta-Mendota Water Authority v. Salazar (*Consolidated Delta Smelt Cases*), 666 F. Supp. 2d 1137 (E.D. Cal. 2009), discussed section 402.02 in considering a facial challenge to a related biological opinion, filed before the administrative record was completed. Plaintiffs argued that FWS acted unlawfully by failing to discuss the four § 402.02 factors on the face of the biological opinion. The decision found that FWS was only required to make explicit findings in the biological opinion on the fourth factor, namely whether the RPA will avoid the likelihood of jeopardy or

adverse modification. "[W]hether FWS properly promulgated the RPA [consistent with the requirements of § 402.02] must be decided on the basis of the entire record." *Id.* at 1158-59.

Export Plaintiffs now bring a record-based challenge to NMFS's alleged non-compliance with § 402.02, asserting that entire RPA is invalid because the record does not support a finding that NMFS complied with the four § 402.02 factors. Doc. 431 at 109-118. DWR joins this aspect of Export Plaintiffs' motion. Doc. 446-1 at 27.

There is scant authority to aid interpretation of § 402.02. The text of the Federal Register Notice promulgating § 402.02 provides limited guidance:

> "Reasonable and prudent alternatives" is defined in the final rule. Section 7(b) of the Act requires the Service to include reasonable and prudent alternatives, if any, in a "jeopardy" biological opinion. An alternative is considered reasonable and prudent only if it can be implemented by the Federal agency and any applicant in a manner consistent with the intended purpose of the action, and if the Director believes it would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat of such species. Further, the Service should be mindful of the limits of a Federal agency's jurisdiction and authority when prescribing a reasonable and prudent alternative. An alternative, to be reasonable and prudent, should be formulated in such a way that it can be implemented by a Federal agency consistent with the scope of its legal authority and jurisdiction. However, the Service notes that a Federal agency's responsibility under section 7(a)(2) permeates the full range of discretionary authority held by that agency; i.e., the Service can specify a reasonable and prudent alternative that involves the maximum exercise of Federal agency authority when to do so is necessary, in the opinion of the Service, to avoid jeopardy. The Service recognizes that economic and technological feasibility are factors to be used in developing reasonable and prudent alternatives, as requested by one commenter. The definition

> of "reasonable and prudent alternatives" has been amended to reflect these considerations. If there are no alternatives that meet the definition of "reasonable and prudent alternatives," the Service will issue a "jeopardy" biological opinion without alternatives.
>
> Two commenters stated that reasonable and prudent alternatives should include mitigation measures designed to reduce adverse effects, i.e., conservation recommendations. One of those commenters urged the Service to limit the scope of recommended alternatives to those "consistent with the scope, magnitude, and duration of the project as well as the extent of its adverse effects." First, because there is a distinction between "reasonable and prudent alternatives" (that satisfy section 7(a)(2)) and "conservation recommendations" (that are authorized by section 7(a)(1)), the Service declines to include conservation measures within the scope of the definition. Second, the Service agrees that reasonable and prudent alternatives should be consistent with the intended purpose of the action and should therefore be economically and technologically feasible, but the Service cannot limit its range of choices to the criteria suggested by the commenter. Reasonable and prudent alternatives must cover the full gamut of design changes that are economically and technologically feasible for an action, independent of who is sponsoring the action.

51 Fed. Reg. 19,926, 19,937 (June 3, 1986).

1. Consistency with Purposes of the Action.

The BiOp reasons that because the operational changes demanded by the RPA do not preclude continued operation of the CVP and SWP, the RPA is consistent with the purpose of the action:

> [T]his RPA is consistent with the intended purpose of the action. According to the BA, "[t]he proposed action is the continued operation of the CVP and SWP." (CVP and SWP operations BA, P. 2-1) Specifically, Reclamation and DWR "propose to operate the Central Valley Project (CVP) and State Water Project (SWP) to divert, store, and convey CVP and SWP (Project) water consistent with applicable law and contractual obligations." (CVP and SWP operations BA, p.1-1) Changes in operation of the projects to avoid jeopardizing listed species or adversely modifying their critical habitats require that additional sources of water for the projects be obtained, or that water delivery be made in a

> different way than in the past (e.g., elimination of RBDD), or that amounts of water that are withdrawn and exported from the Delta during some periods in some years be reduced. These operational changes do not, however, preclude operation of the Projects.

BiOp at 724. The BiOp also discussed the various purposes of the CVP:

> ....The Rivers and Harbors Act of 1937, which established the purposes of the CVP, provided that the dams and reservoirs of the CVP " 'shall be used, first, for river regulation, improvement of navigation and flood control; second, for irrigation and domestic uses; and, third, for power.'" (CVP and SWP operations BA, p. 1-2). The CVP was reauthorized in 1992 through the CVPIA, which modified the 1937 Act and added mitigation, protection, and restoration of fish and wildlife as project purposes. The CVPIA provided that the dams and reservoirs of the CVP should be used "'first, for river regulation, improvement of navigation, and flood control; second, for irrigation and domestic uses and fish and wildlife mitigation, protection and restoration purposes; and, third, for power and fish and wildlife enhancement." (CVP and SWP operations BA p. 1-3) One of the stated purposes of the CVPIA is to address impacts of the CVP on fish and wildlife. CVPIA, Sec. 3406(a). The CVPIA gives Reclamation broad authority to mitigate for the adverse effects of the projects on fish and wildlife, and nothing in the Rivers and Harbors Act of 1937 requires any set amount of water delivery.
>
> In addition to adding protection of fish and wildlife as second tier purposes of the CVP, the CVPIA set a goal of doubling the natural production of anadromous fish in Central Valley rivers and streams on a long-term sustainable basis, by 2002. Sec. 3406(b)(1). This goal has not been met. Instead, as detailed in this Opinion, natural production of anadromous fish has declined precipitously....

Id. at 724-25.

Export Plaintiffs challenge NMFS's finding that the RPA is consistent with the multiple purposes of the Projects. First, Export Plaintiffs argue that NMFS ignored warnings about the water costs of the RPA. For example, DWR commented that "the average combined water supply impact to the SWP and the CVP of the NFMS proposed RPA is roughly 900 [thousand acre feet ("taf")] to 1.1 [million acre feet ("Maf")] (or about 16% to 19%)." AR 00086760. DWR's estimate

continues:

> By taking an alternative approach and layering the NFMS proposed RPA on top of the terms of the USFWS 2008 [Smelt] BiOp RPA that have been provisionally accepted by Reclamation, the average combined water supply impact of the NMFS draft RPA to the SWP and CVP is roughly 150 taf to 750 taf, or about 3% to 15% above the impact of the USFWS 2008 [Smelt] BiOp RPA depending on the range of adaptive actions implemented by the USFWS under the terms of the [Smelt] BiOp. When compared to OCAP Study 7.0, the average combined water supply impact of the collective USFWS [Smelt] RPA and NMFS draft RPA to the SWP and CVP is roughly 1.3 Maf to 1.6 Maf (or about 23% to 29%).
>
> [I]t should be noted that these estimated impacts are incomplete, and we would expect them to be greater because they do not include reoperation of CVP reservoirs as specified in the draft NMFS RPA. In addition, these studies do not include any assessment of the USFWS Fall X2 measure which has not been accepted by Reclamation as reasonable or prudent.

Id. Plaintiffs also point to Reclamation's comments on the RPA, which express general concerns over water supply impacts. AR 00210461-69, 00210473-76, 00105273.

That there are water supply impacts does not necessarily render the RPA inconsistent with the purposes of the action. However, NMFS is absolutely obligated do more than simply check to ensure that the proposed operational changes do not "preclude operation of the Projects." *See* BiOp at 724. Assumedly, if the Projects delivered ten AF of water in a water year, the Projects would be "operating." An RPA that effectively eliminates Project water deliveries to parts of the CVP's service area is inconsistent with one of the co-equal purposes of that project.[28] What is the ultimate impact of the

[28] Federal Defendants cite *Kandra v. United States*, 145 F. Supp. 2d 1195, 1207 (D. Or. 2001), which briefly discusses consistency with the project purposes, for the proposition that so long as wildlife protection is a legitimate purpose of a

salmonid BiOp RPA? The BiOp does not provide explicit answers to these questions. The BiOp predicted a lower estimate of water supply costs than DWR:

> NMFS estimates the water costs associated with the RPA to be 5-7% of average annual combined exports: 5% for CVP, or 130 TAF/year, and 7% for SWP, or 200 TAF/year. The combined estimated annual average export curtailment is 330 TAF/year. These estimates are over and above export curtailments associated with the USFWS' Smelt Opinion. The OMR restrictions in both Opinions tend to result in export curtailments of similar quantities at similar times of year. Therefore, in general, these 330 TAF export curtailments are associated with the NMFS San Joaquin River Ratio actions in the RPA.
>
> NMFS also considered that there may be additional localized water costs not associated with South Delta exports. These may include, in some years, localized water shortages necessitating groundwater use, water conservation measures, or other infrastructure improvements in the New Melones service area, and localized impacts in the North of Delta in some years, associated with curtailments of fall deliveries used for rice decomposition. NMFS considered whether it was

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project, an RPA designed to protect a species is consistent with the purposes of that. In *Kandra*, water user plaintiffs sought to enjoin Reclamation from implementing a 2001 Annual Operations Plan for the Klamath Reclamation Project, which included RPAs that would modify flows to support listed species, resulting in complete curtailment of water deliveries to the majority of land within the Klamath Project. *Id.* at 1195-96. Plaintiffs argued that the purpose of the Klamath Project, pursuant to the Reclamation Act, is irrigation, and that the RPAs adopted by Reclamation benefit fish to the detriment of irrigation was inconsistent with the Project's purpose. *Id.* at 1207. The district court found this argument unpersuasive:

> True, an RPA is defined as an alternative action[,] which is "consistent with the purposes of the action...." 50 C.F.R. § 402.02. ...[A]gency actions taken pursuant to the Reclamation Act must comply with the requirements of the ESA. See Tennessee Valley Authority v. Hill, 437 U.S. 153, 185 (1978) (ESA obligations take "priority over the 'primary' missions" of federal agencies). Further, agency actions are subject to the government's duty to protect tribal resources. Reclamation's legal duty to operate the Project consistent with its ESA and tribal trust obligations does not render the RPAs inconsistent with the Project's purpose. [*Klamath Water Users Protective Ass'n v.] Patterson*, 204 F.3d [1206,] 1213-14 [(9th Cir. 1999)].

Id. at 1207. This non-binding decision is decidedly unpersuasive, as it ignores the competing, Congressionally mandated irrigation purpose. Even if the logic of *Kandra* is accepted, *arguendo*, the Agency has a duty to closely examine the adverse effects to prevent emasculation of the co-equal purpose of irrigation.

> feasible to model and estimate any water costs associated with the Shasta or American River RPA actions, and discussed this issue with Reclamation. In general, it was decided that modeling tools were not available to assess these costs and/or that costs would be highly variable depending on adaptive management actions, and therefore, not meaningful to model.

BiOp at 720-21 (footnote omitted).

The agency abandoned its legal duties and said in effect: "we can't model, we won't do it." However, much of the Defendants' support for the BiOp and its RPA actions is based upon the same highly variable and questionable modeling of species populations and effects from exports. As this agency practices, what is "science" for the "goose" is clearly not "for the gander."

Export Plaintiffs argue that NMFS has failed to explain why its estimate is more reliable than the 900,000 - 1,100,000 AF water cost estimate (16%-19% of the Projects' combined water supply) provided by DWR, one of the Project co-operators. Doc. 431 at 113-14. In particular, Export Plaintiffs challenge the BiOp's consideration of only the impacts of export curtailments "associated with the NMFS San Joaquin River Ratio actions in the RPA," presumably a reference to Action IV.2.1. The BiOp explains that many of the OMR restrictions in both the Salmon and Smelt BiOps "tend to result in export curtailments of similar quantities at similar times of year," but does not explain why it is appropriate to entirely ignore the effects of those curtailments that may overlap with those mandated by the Smelt BiOp. This requires further clarification and revision in light of competent

and meaningful impact studies.[29]

Even assuming, *arguendo*, the BiOp's water cost prediction is correct, is such a reduction "consistent" with the irrigation purpose of the CVP? How should the RPA analyze the extent of water supply reductions that are consistent with the co-equal legislative irrigation purpose? The ESA provides no guidance, nor do the joint ESA regulations or any other authority identified by any party. It cannot simply be said that if an ESA-listed species' protection is at stake, the "no balancing of hardships" principle excludes such consideration. This would impermissibly rewrite Reclamation law to eliminate the regulatory requirement that NMFS consider the RPA's effect on the co-equal statutory purpose of irrigation. Federal Defendants' examination of this factor is insufficient. Export Plaintiffs' motion for summary judgment on this issue is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

2. Consistency with the Action Agency's Legal Authority and Jurisdiction.

Export Plaintiffs dispute the BiOp's conclusion that the RPA can be implemented in a manner consistent with the legal authority and jurisdiction of Reclamation and DWR. The BiOp reasons that "[t]he

[29] Export Plaintiffs also challenge the BiOp's related conclusion that the 330,000 AF of export curtailments "can be offset by application of (b)(2) water resources, water conservation, groundwater use, water recycling and other processes currently underway." BiOp at 580. This is not an essential element of the BiOp's reasoning, as NMFS later concedes that "NMFS could not be reasonably certain b(2) water would be available" and indicates that the BiOp's analysis of the RPA actions does not depend on the availability of (b)(2) water. *Id.* at 722.

CVPIA gives Reclamation broad authority to mitigate for the adverse effects of the projects on fish and wildlife, and nothing in the Rivers and Harbors Act of 1937 requires any set amount of water delivery." BiOp at 724-25. The BiOp also recognizes that the CVPIA contains a goal of doubling the natural production of anadromous fish in Central Valley rivers and streams, and that this goal has not yet been met. *Id.* at 725. As Federal Defendants well know, the CVPIA dedicates a finite 800,000 AF of annual CVP yield to the fish-doubling objective.

The BiOp reasons that Reclamation has broad powers to restore anadromous fish populations:

> A 2008 report on the CVPIA anadromous fish program by independent reviewers (Cummins *et al.* 2008), recommended by the Office of Management and Budget and requested by Reclamation and the USFWS, stated that
>
> > "it is far from clear that the agencies have done what is possible and necessary to improve freshwater conditions to help these species weather environmental variability, halt their decline and begin rebuilding in a sustainable way. A number of the most serious impediments to survival and recovery are not being effectively addressed, especially in terms of the overall design and operation of the [CVP] system."
>
> One of the review panel's specific recommendations was that the agencies
>
> > "should develop a more expansive view of the authorities at their disposal to address the problems, especially with regard to water management and project operations. The agencies have followed a more restrictive view of their authorities than appears legally necessary or appropriate to the seriousness of the mission. "
>
> The report notes that the CVPIA contains a "long list of operational changes, actions, tools, and authorities – some quite specific and discrete, some general and on-going – that Interior is to use to help achieve the anadromous fish restoration purposes of the CVPIA ...." (Cummins *et al.*

> 2008 at 5) The report then describes development of a Final Restoration Plan that would utilize these authorities, but concludes that "[t]he agencies implement the CVPIA . . . in a way that bears little resemblance to the integrated, coordinated, holistic vision of the Final Restoration Plan." (Cummins *et al.* 2008 at 9)
>
> Most relevant to this consultation, the review panel observed that
>
> > "[i]t would seem that CVPIA activities and personnel should be central to the OCAP plan, the Section 7 consultation, and the agencies' efforts to satisfy the requirements of the ESA (that is, after all, one of the directives of the CVPIA). The panel received no information or presentations on the involvement of the CVPIA program or personnel in the ESA consultation effort ... and in the determination of what actions the agencies should be taking to meet the ESA."
>
> (Cummins *et al.* 2008 at 11)

Id. The CVPIA contains prescriptives; it does not elevate the ESA over all other statutory purposes for use of Project water. Although specific provisions of the law may authorize finite increase in fish protection water appropriation, there is no indefinite, unlimited power for NMFS to take whatever Project water it deems essential for the species.

The BiOp also finds that "state law gives DWR authority to provide for needs of fish and wildlife independent of the connection of the two water projects."

> According to the [Biological Assessment], DWR
>
> > "is required to plan for recreational and fish and wildlife uses of water in connection with State-constructed water projects and can acquire land for such uses (Wat. Code Sec. 233, 345,346, 12582). The Davis-Dolwig Act (Wat. Code Sec. 11900-11925) establishes the policy that preservation of fish and wildlife is part of State costs to be paid by water supply contractors, and recreation and enhancement of fish and wildlife are to be provided by appropriations from the General Fund."

> (CVP/SWP operations BA, page 1-4) DWR, like Reclamation, has broad authority to preserve and enhance fish and wildlife.

Id. at 726.

Although § 402.02's RPA requirements demand that NMFS engage in an evaluation of its legal authority to implement the RPA Actions, NMFS's interpretations of these laws set forth in the BiOp are not entitled to deference, as they were neither promulgated through notice and comment rulemaking procedures, *see Chevron v. NRDC*, 467 U.S. 837 (1984), nor contained within an agency policy statement, manual, enforcement guideline, or other document entitled to limited deference, *see Skidmore v. Swift & Co.*, 323 U.S. 134 (1944); *Christensen v. Harris County*, 529 U.S. 576, 587 (2000).

State and federal law impose upon Reclamation and DWR a nondiscretionary duty to comply with state water rights law. *See* 43 U.S.C. § 383; *California v. United States*, 483 U.S. 645, 675 (1978). Export Plaintiffs point to the "obligation imposed upon both Reclamation and DWR by D-1641 to comply with the reasonable and beneficial use requirements and prohibition against waste [of water] set forth in Article X, section 2 of the California Constitution, in their respective operations of the CVP and SWP." Doc. 431 at 117. The argument continues:

> Because there is no indication in the record that NMFS undertook any analysis of whether DWR and Reclamation have jurisdiction and authority under the reasonable and beneficial use requirements of California law to annually reallocate hundreds of thousands of acre feet of project water, particularly where the benefits to listed salmonid species have not been demonstrated, the requirements of

Section 402.02 and the ESA have been violated.

Id.

It is undisputed that California law identifies the preservation of fish and wildlife as a beneficial use of water. Cal. Water Code § 1243. In addition to requiring compliance with California's reasonable and beneficial use standard, D-1641 imposes a condition upon both Reclamation's and DWR's water rights requiring both to "meet[] all requirements of the applicable Endangered Species Act for the project authorized under [their respective] permit[s]/license[s]." D-1641 at 148. When jeopardy is found, the ESA requires implementation of a RPA. D-1641 authorizes Reclamation's implementation of lawful RPAs.[30]

However, several of the specific RPA prescriptions have failed to demonstrate compliance with the Handbook's requirement that every RPA be "essential to avoid jeopardy and/or adverse modification." Obviously, to the extent that any RPA Action has been found unlawful, Federal Defendants cannot establish that implementation of that RPA is consistent with Reclamation's legal authority.

Export Plaintiffs' motion for summary judgment that NMFS failed to demonstrate the RPA's consistency with Reclamation and DWR's legal authority is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. To the extent

[30] In light of D-1641's requirement that DWR and the Bureau comply with the ESA, Export Plaintiffs have not pointed to any substantive statute or jurisdictional limitation that precludes the Reclamation or DWR from implementing a lawful ESA RPA. The SR Plaintiffs have made such an argument. That argument is addressed below.

individual RPA Actions are otherwise lawful, Export Plaintiffs' argument that Federal Defendants' failed to demonstrate Reclamation's authority to implement those Actions is belied by D-1641, which expressly requires implementation of lawful RPA Actions. Correlatively, to the extent individual RPA Actions are unlawful, Federal Defendants cannot find authority for their implementation.

3. Economic and Technical Feasibility.

The BiOp contains a lengthy discussion of economic and technical feasibility. Export Plaintiffs attack the discussion as insufficient in several respects. First, Export Plaintiffs argue that NMFS ignored objections and evidence submitted by Reclamation and DWR suggesting that the RPA was not technologically or economically feasible. A March 23, 2009 letter from Reclamation to NMFS details a number of concerns with the proposed RPA. *See* AR 00105277-84. A March 20, 2009 letter from DWR to NMFS describes some specific feasibility concerns and a general objection that several of the RPA actions were not economically feasible. *See* AR 00105285-99.

Export Plaintiffs object generally that NMFS failed to articulate a reasoned response to DWR and Reclamation's objections. Doc. 431 at 114. The BiOp explained that the relevant state and federal agencies engaged in a back-and-forth exchange of information regarding feasibility of the RPA and adjustments were made:

> Some of the more complex RPA actions, including Shasta Storage, Habitat Rearing Actions, Passage Program, Stanislaus Flows and the San Joaquin River Inflow Export Ratio, went through many iterations of review, re-drafting,

and refinement, involving interagency staff and management expertise, including biology, ecology, hydrology, and operations, in order to ensure that the actions were based on best available science, would be effective in avoiding jeopardy, and would be feasible to implement. NMFS also secured outside contractual services to provide additional modeling expertise in evaluating draft RPA actions.

Examples of Feasibility Concerns in RPA Actions
As a result of this iterative consultation process, NMFS considered economic and technological feasibility in several ways when developing the CVP/SWP operations RPA. Examples include:

1) Providing reasonable time to develop technologically feasible alternatives where none are "ready to go" – e.g., the Delta engineering action (Action IV.1.3), and lower Sacramento River rearing habitat action (Action I.6.1);

2) Calling for a stepped approach to fish passage at dams, including studies and pilot projects, prior to a significant commitment of resources to build a ladder or invest in a permanent trap and haul program. A reinitiation trigger is built into this action in the event passage is not deemed feasible, prior to construction of permanent infrastructure;

3) Considering limitations of the overall capacity of CVP/SWP systems of reservoirs in determining feasibility of flow actions below reservoirs, and considering the hydrologic record and CALSIM modeling results (Shasta/Sacramento River, Folsom/American River, New Melones/Stanislaus River).

4) Tiering actions to water year type and/or storage in order to conserve storage at reservoirs and not unduly impact water supplies during drought (e.g., see appendix 5);

5) Providing health and safety exceptions for export curtailments;

6) Using monitoring for species presence to initiate actions when biologically supported and most needed, in order to limit the duration of export curtailments;

7) Incorporating scientific uncertainty into the design of the action, when appropriate, in order to refine the action over time (e.g., 6-year acoustic tag study for San Joaquin steelhead).

8) Incorporating performance goals into more complex actions (for example, Shasta storage, rearing habitat

> and San Joaquin acoustic tag study). A performance goal approach will allow for adaptation of the action over time to incorporate the most up-to-date thinking on cost-effective technologies or operations.
>
> 9) Allowing for interim, further constrained, water deliveries to TCCA through modified RBDD operations for 3 years, while an alternative pumping plant is being built.

Id. at 719-20.

NMFS viewed adaptive management as another tool to address feasibility issues:

> The RPA includes collaborative research to enhance scientific understanding of the species and ecosystem, and to adapt actions to new scientific knowledge. This adaptive structure is important, given the long-term nature of the consultation and the scientific uncertainty inherent in a highly variable system. Monitoring and adaptive management are both built into many of the individual actions and are the subject of an annual program review. This annual program review will provide for additional opportunities to address any unforeseen concerns about RPA feasibility that may arise.

Id. at 720.

Export Plaintiffs do not identify any specific technological feasibility objection that was not addressed by NMFS's adjustments to the draft RPA. Export Plaintiffs do argue that NMFS ignored "extensive evidence" submitted by DWR about economic feasibility. DWR informed NMFS of its opinion as to the economic impact of the RPA:

> For the 2004 scenario, the NMFS draft RPA would have a net economic impact of about $320 million to $390 million per year while the combined costs of both the USFWS and NMFS opinions would be about $500 million to $670 million per year. For the 2030 scenario, the NMFS draft RPA in the Delta would have a net economic impact of about $320 million to $390 million per year while the combined costs of both the USFWS and NMFS opinions would be about $480 million to $620 million per year.

AR 00113831-32. Export Plaintiffs argue that according to DWR's figures, the net cost of the NMFS RPA over a 20-year implementation period could exceed $8 billion dollars. Doc. 431 at 115. Based on its own figures, DWR urged NMFS to find that the RPA did not meet the standard for economic feasibility. AR 00113831-32.

Does section 402.02 contemplate consideration of economic costs to third parties or just to the action agencies? Without any analysis or legal authority, the district court in *Kandra* conluded: "Read in context ... the RPAs must be economically and technically feasible for the government to implement." *Id*. at 1207 (emphasis added). The regulation itself does not specify whether feasibility should be limited to the economic impact on the action agencies or on others affected by the agency action. Defendants contend the regulation must be interpreted in a manner that does not violate *TVA v. Hill*, 437 U.S. 153, 184 (1978), which concluded that Congress enacted the ESA to "halt and reverse the trend toward species extinction, whatever the cost." (Emphasis added.) This language directs the conclusion that the economic feasibility requirement refers only to the costs to the action agency, requiring analysis of whether the corrective measures required by an RPA can be implemented from a purely budgetary perspective.

NMFS engaged in such an analysis. Starting with its 330,000 AF water supply impact projection, which has been remanded for other reasons, NMFS examined the impact of water supply reductions on

Reclamation and DWRs costs:

> In evaluating economic feasibility, NMFS examined the direct costs of the modified operations to the Federal action agency, Reclamation. According to the [California State Legislative Analyst's Office ("LAO")], 85% of Reclamation's costs are reimbursed by water users, and 95% of DWR's SWP costs are reimbursed:
>
> > Irrigation water users pay about 55 percent of CVP reimbursable costs ($1.6 billion), while municipal and industrial water users are responsible for the remaining 45 percent (or about $1.3 billion). These reimbursements are paid through long-term contracts with water agencies. The total capital cost to construct the CVP as of September 30, 2006, is about $3.4 billion. The federal Bureau of Reclamation calculates how much of the capital construction cost is reimbursable from water users. Currently, users pay about 85 percent of total costs. In contrast, more than 95 percent of SWP's costs are reimbursable from water users. The costs assigned to such CVP purposes as flood control, navigation, and fish and wildlife needs are not reimbursable and are paid by the federal government.
>
> (LAO, 2008) Through this arrangement, costs to the action agency itself are minimized.

BiOp at 723. NMFS also evaluated direct Project Costs.

> In addition to water costs, Reclamation and DWR will incur project costs associated with certain RPA actions (e.g., the fish passage program). The State of California has authorized $19.6 billion in water-related general obligation bonds since 2000, and these bonds often contain provisions for environmental conservation related purposes (LAO, 2008). Over $3 billion has been spent through the Calfed Bay-Delta Program. The CALFED ROD contains a commitment to fund projects through the Ecosystem Restoration Program. Similarly, the CVPIA AFRP funds eligible restoration projects, using federal authorities. Some of the projects in the RPA may qualify for those sources of funds.

Id. at 723-24.

Even assuming DWR's higher water costs figures (approximately three times NMFS's estimate), no party suggests that the costs to the agency would be prohibitive, given the reimbursement structure.

Export Plaintiffs' motion for summary judgment that NMFS failed to

demonstrate economic and technological feasibility is DENIED. Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. DWR's specific challenge to the feasibility of Action IV.4.2 is addressed separately below.

4. Avoidance Jeopardy and/or Adverse Modification.

Export Plaintiffs incorporate by reference their substantive challenges to the RPA, arguing that for all those reasons, NMFS failed to comply with the fourth requirement of section 402.02. Consistent with and incorporating the rulings on the merits of the challenges to RPA Actions IV.2.1, IV.2.3 and IV.3, Export Plaintiffs' motion regarding the fourth section 402.02 requirement is GRANTED IN PART AND DENIED IN PART and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART. While there is some record support for the general approaches used in these RPA Actions, the specific prescriptions imposed are not sufficiently justified. As a result, NMFS did not reasonably conclude that Actions IV.2.1, IV.2.3 and IV.3 were essential to avoid jeopardy to the continued existence of the Listed Species and/or destruction or adverse modification of the species' critical habitat.

5. DWR's Feasibility Challenges to Action IV.4.2.

The stated objective of Action IV.4.2, entitled "Skinner Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency," is to "[i]mplement specific measures to reduce pre-screen loss and improve screening efficiency at state facilities."

BiOp at 655. The Action requires DWR to undertake the following actions at the Skinner Fish Collection Facility:

> 1) By December 31, 2012, operate the whole Skinner Fish Protection Facility to achieve a minimum 75 percent salvage efficiency for CV salmon, steelhead, and Southern DPS of green sturgeon after fish enter the primary channels in front of the louvers.
>
> 2) Immediately commence studies to develop predator control methods for Clifton Court Forebay that will reduce salmon and steelhead pre-screen loss in Clifton Court Forebay to no more than 40 percent.
>
> > a) On or before March 31, 2011, improved predator control methods. Full compliance shall be achieved by March 31, 2014. Failure to meet this timeline shall result in the cessation of incidental take exemption at SWP facilities unless NMFS agrees to an extended timeline.
> >
> > b) DWR may petition the Fish and Game Commission to increase bag limits on striped bass caught in Clifton Court Forebay.
>
> 3) Remove predators in the secondary channel at least once per week.

Id. at 655-56.

a. Is Action IV.4.2 Inconsistent with Action IV.4.

DWR argues that Action IV.4.2 is arbitrary and capricious because it is inconsistent with Action IV.4 ("Modifications of the Operations and Infrastructure of the CVP and SWP Fish Collection Facilities"), which provides:

> Objective: Achieve 75 percent performance goal for whole facility salvage at both state and Federal facilities. Increase the efficiency of the Tracy and Skinner Fish Collection Facilities to improve the overall salvage survival of winter-run, spring-run, CV steelhead, and green sturgeon.
>
> Action: Reclamation and DWR shall each achieve a whole facility salvage efficiency of 75 percent at their

> respective fish collection facilities. Reclamation and DWR shall implement the following actions to reduce losses associated with the salvage process, including: (1) conduct studies to evaluate current operations and salvage criteria to reduce take associated with salvage, (2) develop new procedures and modifications to improve the current operations, and (3) implement changes to the physical infrastructure of the facilities where information indicates such changes need to be made. Reclamation shall continue to fund and implement the CVPIA Tracy Fish Facility Program. In addition, Reclamation and DWR shall fund quality control and quality assurance programs, genetic analysis, louver cleaning loss studies, release site studies and predation studies. Funding shall also include new studies to estimate green sturgeon screening efficiency at both facilities and survival through the trucking and handling process.
>
> By January 31 of each year, Reclamation and DWR shall submit to NMFS an annual progress report summarizing progress of the studies, recommendations made and/or implemented, and whole facility salvage efficiency. These reports shall be considered in the Annual Program Review.

Id. at 653-54. DWR suggests that Action IV.4 defines 75% salvage efficiency as a "performance goal," rather than a requirement, and therefore that Action IV.4.2's "requirement" of 75% efficiency is inconsistent with Action IV.4. Action IV.4 does not relegate the 75% target to the status of a "performance goal." The action sets a requirement for the Bureau and DWR "shall each achieve a whole facility salvage efficiency of 75 percent." *Id.* at 653. There is nothing equivocal about this language and no inconsistency between Actions IV.4 and IV.4.2.

DWR's motion for summary judgment that Action IV.4.2 is unlawful because it is inconsistent with IV.4 is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

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b. DWR's Argument that the Record Does not Support the Conclusion that Action IV.4.2 (Subpart(1)) is Economically and Technologically Feasible.

DWR next complains that the record does not support the conclusion that the first subpart of Action IV.4.2, which requires 75% salvage efficiency at the Skinner Fish Facility for Chinook salmon, CV steelhead, and Southern DPS of green sturgeon by December 31, 2012, is technologically or economically feasible. DWR maintains that NMFS arbitrarily took the "goal" of Action IV.4, namely achieving a 75% salvage efficiency for the Skinner Fish Facility, turned it into an "action," and "slapped a date for compliance on the goal." Doc. 446-1. DWR's first premise -- that the 75% efficiency target in Action IV.4.2 is a "goal" – is mistaken. Nor is it inherently illogical for NMFS to impose a compliance deadline for the 75% target. DWR has been studying salvage efficiency and ways to improve the salvage process for many years, *see, e.g.*, AR 00109712-31, and NMFS was warned by a Reclamation biologist with experience working with individuals at the facility that without a deadline, improvements might never take place, AR 00105052. The deadline of December 31, 2012 provided DWR with approximately three and a half years from the adoption of the BiOp in June 2009. DWR has not demonstrated that imposing this deadline was irrational or arbitrary.

DWR next argues that the record does not support the conclusion that the standard of 75% efficiency at the Skinner Fish Facility is technologically or economically feasible. DWR points to its assertion in a March 20, 2009 letter to NMFS that it might not be possible to

meet the December 31, 2012 deadline.

> Part 1 of this action is infeasible because it requires DWR to operate Skinner Fish Protection Facility to achieve a minimum 75% salvage efficiency for salmonids and green sturgeon by December 31, 2012. While DWR can strive to achieve this rate of success by that date, there is uncertainty that it can occur within that timeframe. To incrementally improve the salvage efficiency within Skinner Fish Protection Facility will require the efficiency of each component to be determined and a strategy developed to identify the most effective improvements to be made. Testing within a hydraulic lab may be required to evaluate the improvements of potential structural changes within the facility. In addition, making the actual modifications will take time. It is quite likely that these efforts will extend past the required implementation date. We recommend that a process involving the annual progress reports required by January 31 st be incorporated into this action. The process would involve the review of the annual status report by DWR and NMFS to determine if satisfactory progress is being made toward meeting the salvage requirement and, if it is determined that satisfactory progress is being made but the deadline of December 31,2012 will not be met, NMFS will adjust the deadline accordingly.

AR 00078204. That DWR's expressed "uncertainty" to NMFS that it could not meet the higher target by the end of 2010 does not mean the action is "infeasible." One and one-half years remain to perform.

DWR also maintains that NMFS had information indicating that DWR could not even complete the necessary studies on the current facilities' efficiency by the deadline. Steelhead studies had been ongoing since 2005, AR 00003660, 3642, 4105, 4128-29. DWR maintains that "[t]here are no similar studies as to sturgeon and salmon and "[f]rom the steelhead facility study, NMFS was aware that a study on facility efficiency would take at least three years to perform." However, DWR provides no record citation to support this three-year timeframe. To the contrary, the methods described in a 2008 technical study plan for the Tracy Fish Facility suggest that the actual

experiments would be run over a period of only several months. AR 00078557, 00078563 (explaining that efficiency experiments for fiscal year 2009 will be "completed during the months of March-June," with results available by August 2010).

DWR next argues "the standard for efficiency imposed by NMFS seems to have changed from 90%, to 80%, to 75%" without explanation as to whether one or any of the standards was economically or technologically feasible. Doc. 446-1 at 6. Federal Defendants emphasize that a study cited by DWR found that the Skinner Fish Collection Facility is already operating at an estimated 74% efficiency for steelhead. AR 00113798 (cited in BiOp at 346). Federal Defendants further explain the reasoning behind the 75% efficiency standard:

> ... NMFS's decision to require this efficiency rate was based on numerous studies and NMFS's own technical experience working with both the state and federal facilities over the last 20 years. In choosing the 75% salvage efficiency at the Skinner Fish Facility, NMFS considered, among other things: (i) the fish facilities' original design, which was 90-95% efficiency based on juvenile striped bass similar in size to Chinook salmon smolts; (ii) historical efficiency testing performed by the California Department of Fish and Game; (iii) and current efficiency estimates performed by DWR, which is 74% ± 7%. NMFS 00113798.
>
> NMFS considered whether the original 90-95% design efficiency could be met at the facilities. However, over the years the efficiency of both the State and the Federal facility has varied due a variety of problems in the southern Delta, including, among other things, surface water levels, aquatic weeds, corrosion, introduced species like the mitten crab, and infrastructure age. NMFS 50871-73; NMFS 112963 (DWR noting similar "challenges"). Thus, given these changes in Delta conditions, NMFS concluded it would be

> unreasonable to assume the original 90-95% design efficiency could be met.
>
> To determine a reasonable efficiency rate, NMFS also reviewed the history of the facilities and consulted with the Denver Technical Center. Contrary to DWR's claim that "facility efficiency is currently unknown," DWR Br. at 6, there have been a number of studies to determine the what that efficiency rate is in order to mitigate for the loss of striped bass and Chinook salmon (i.e., mitigation requirements established in the 1986 4-Pumps Agreement between DFG and DWR). A study conducted by DFG and DWR in 1994 based on 13 years of data established methods and a process for DWR to use to calculate the facility efficiency at each one of its four bays. NMFS 109712-731 (Brown *et al.* 1996). A review of the salmon losses related to the CVP and SWP export pumping in that study found that facility efficiency ranged from 70 - 85% at the primary louvers, and 70 - 95% at the secondary louvers for the Skinner Fish Facility. NMFS 109712-731 (Brown *et al.* 1996). NMFS's 75% criteria is within the established range and conservatively lower than the average efficiency as stated in previous studies. Similarly, the first biological opinion on winter-run Chinook salmon assumed 75% salvage efficiency in calculating the loss at Skinner Fish Facility. NMFS 127399-454 (NMFS 1992).
>
> Moreover, the current Skinner Fish Facility efficiency, which is calculated on a daily basis by DFG in order to estimate the loss at facility, uses a efficiency rate for the louvers is 0.630 for fish < 101 mm and 0.568 for fish 100 mm, plus the primary channel flow divided by the primary channel volume. Overall, calculated louver efficiencies are typically in the range of 70-80% for most salmon that enter the facility. *See e.g.*, NMFS 109725-26 (estimating "70 and 85 percent" at primary louvers and "70 to 95 percent" at secondary louvers, and noting CDFG "combined the data to obtain an overall ... screen efficiency ... calculated as 0.630 for fish < 101 mm, and 0.568 for fish 100 mm, divided by an approach velocity"). Critically, DWR's own brief states that the Skinner Fish Facility efficiency "was estimated to be 74% +- 7%" in a 2008 DWR study, DWR Br. at 6, which meets the criteria set forth in the BiOp. NMFS 113798. Thus, it is possible that no further action may be necessary, except to initiate a study to determine efficiency for green sturgeon through the facility.

Doc. 477 at 104-106.

DWR argues that Brown, *et al.* (1996) is based upon obsolete data collected at the louvers approximately 40 years ago, in 1970 and 1971. AR 00109725. The Brown study recognized that changes to the Skinner Fish Facility had been made between the time the data was collected and the article's publication. AR 00109728. Therefore, DWR argues that the data relied upon in Brown, *et al.* (1996) does not reflect the current or potential efficiency at the Skinner Fish Facility. Doc. 495 at 10. Nor does the data reflect the entire process by which DWR protects fish at Skinner, which involves handling, trucking, and releasing entrained fish. The focus of Action 4.2.1(1) is the overall efficiency of the Skinner Facility, not just the louver facility. *Id.*

Federal Defendants do not respond to these critiques of the obviously outdated Brown (1996) study, but instead focus on the fact that DWR's own 2007 study predicted that efficiency at the entire Skinner Facility was estimated to be "74 ± 5% (mean ±95% Confidence Interval) for the 2007 study period. AR 00113798. DWR objects that "even this data does not support Federal Defendants' conclusion that an improvement of 1% to 75% overall efficiency standard for operating the Skinner Fish Facility as to Chinook salmon, steelhead trout, and green sturgeon, is economically and technologically feasible by the date imposed under the BiOp." Doc. 495 at 10-11. Based on the information before NMFS, was it unreasonable to conclude that a 1% improvement was technologically or economically feasible? NMFS

justifies its conclusion on the ground that DWR "did not say it could not possibly reach a one percent higher efficiency target by 2012." Doc. 477-1 at 107 (emphasis added). Rather, DWR's comment letter stated that DWR had "uncertainty" as to whether the efficiency improvements were feasible.

To uphold an agency's decision, its rationale must "reasonably be discerned," from the record. *See Modesto Irr. Dist.*, 619 F.3d at 1035. Here, NMFS has failed to cite any record evidence indicating that the efficiency improvement, albeit a minor one, is economically or technologically feasible. DWR's own 2007 study indicates the efficiency is close to the target, from which it could be inferred that the technological changes may be possible, but the record lacks affirmative support for a finding of feasibility.

DWR's motion for summary judgment that the record lacks support for a finding that Action IV.4.2(1) is feasible is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. DWR's Argument that the Record Does not Support the Conclusion that Action IV.4.2 (Subpart(2)) is Economically and Technologically Feasible

DWR maintains that the record does not support NMFS's economic and feasibility determination as to subpart 2 of Action IV.4.2, which requires reduction of predation at Clifton Court Forebay to 40% by March 31, 2014.

There is undisputed record evidence that at DWR's facility, most loss of fish occurs in the Clifton Court Forebay. AR 00117410-441

(Gingras 1997). DWR concedes that pre-screen loss at the Forebay is estimated at between 63 and 99% for juvenile Chinook salmon. Doc. 446-1 at 7 (citing BiOp at 348 and AR 00106736).

It is also undisputed that reducing predation would improve survival across the Forebay. *See* AR 00113817 (DWR (2008)). However, DWR argues that the record does not support Action IV.4.2(2)'s imposition of the specific requirement that DWR reduce "predation" in the Forebay to 40%. In support of Action IV.4.2(d), NMFS cites a 2008 DWR study that in turn cites a 1952 study by Ricker. Doc. 477-1 (citing AR 113817). Ricker concluded that when survival rates are below 25%, a reduction of predator numbers to below 50% can double the survival rate of the prey. But, DWR points out that Ricker's finding that predator numbers should be reduced to below 50% is distinct from whether predation should be reduced to below 50%.[31] In response, Federal Defendants disclaim reliance on Ricker, asserting that NMFS considered DWR (2008) as support for the proposition that predator removal is a method of reducing pre-screen loss. Doc. 515 at 44. Rather than rely directly on Ricker's work, NMFS "reasoned by simple math that if predation was reduced by half to no more than 40%, giving

[31] DWR points out that, in response to DWR's motion to admit expert testimony, Federal Defendants made a judicial admission that they would not rely on Ricker's 1952 study or the statement that when survival is below 25%, a reduction of predator numbers to below 50% can double survival. *See* Doc. No. 464; Draft Tr. 7/19/10 at 61-67. Relying on that admission, the Court concluded expert testimony was not needed to explain application of the Ricker study. Doc. 464 at 1-2. DWR now asserts that it is prejudiced by Federal Defendants reliance on a passage that discusses Ricker because DWR "does not have an expert to explain DWR (2008) and the Ricker equation. However, DWR successfully explains the Ricker study and NMFS's use of it. *See* Doc. 495 at 4-5. Expert clarification is unnecessary. Nonetheless, Federal Defendants are precluded from using the 1952 Ricker study after they said they would not.

60% survival rather than 20-25% survival, overall survival through the Skinner Facility would reach approximately 39%, roughly equivalent to the current CVP survival efficiency." *Id.* Federal Defendants provide no record citation related to this imprecise guestimate.

Even if the 40% target is scientifically justified, whether predation in the Forebay is a problem and/or whether a reduction to 40% is a reasonable goal is an entirely different inquiry from whether reducing predation to 40% is feasible. NMFS mentions numerous examples of methods of reducing predators on juvenile salmon and steelhead, but nothing in the record indicates whether the 40% target can be met, or whether it could be met by the deadline imposed by the BiOp.[32] It cannot be determined from the existing record whether NMFS's feasibility determinations are supportable. There is no explanation.

DWR's motion for summary judgment that the record lacks support for a finding that Action IV.4.2(2) is feasible is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

d. DWR's Argument that Action IV.4.2 is Arbitrary and Capricious Because it Fails to Explain How the Action Will Avoid Jeopardy and/or Adverse Modification.

DWR also argues that the record does not support NMFS's finding that Action IV.4.2 is essential to avoid jeopardy and/or adverse modification. There is record evidence to support NMFS's findings that pre-screen loss and loss due to salvage are significant and that

[32] While Action IV.4.2(2) provides that NMFS may agree to an extended timeline, the Action provides no basis for determination of whether an extension should be given.

reducing these sources of loss will improve survival. However, the record does not explain why increasing the existing salvage efficiency by 1% and/or reducing predation to 40% "is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (requiring a "thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification"). The RPA is not lawful without the required through explanation, which shall be provided on remand.

VI. STANISLAUS RIVER PLAINTIFFS' CLAIMS.

A. Relevant Factual Background.

1. The New Melones Project.

The New Melones Project was approved as the last unit of the CVP in 1962. Pub. L. No. 87-874, 76 Stat. 1173, 1191-92 (1962). The New Melones Project includes a dam and 2.4 million acre-foot reservoir on the Stanislaus River. USBR AR 007570. The New Melones Reservoir is "operated primarily for purposes of water supply, flood control, power generation, fishery enhancement, and water quality improvements in the lower San Joaquin River. The reservoir and river also provide recreation benefits." *Id.* The United States holds appropriative water rights issued by the SWRCB for the New Melones Project, conditioned by Water Rights Decisions 1422, 1616 and Revised Decision 1641 ("D-1641"). *See generally* USBR AR 007571-73.

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2. The Stanislaus River Plaintiffs.

Plaintiffs Oakdale Irrigation District ("OID"), and South San Joaquin Irrigation District ("SSJID") hold pre-1914 water rights to Stanislaus River water. OID and SSJD receive water from New Melones under a 1988 Agreement with the United States designed to fulfill their prior rights. USBR AR 007571-72; USBR AR 011751. That agreement requires Reclamation to provide to OID and SSJID:

- The inflow into New Melones plus the amount derived by the formula of (600,000 minus inflow) divided by 3, not to exceed 600,000 AF per year, USBR AR 011751; and
- The right to conserve up to 200,000 AF in New Melones, USBR AR 011752.

Plaintiff Stockton East Water District ("SEWD") is one of only two "Eastside Contractors" that receive a CVP supply from New Melones pursuant to Reclamation water service contracts. SWED's contract provides for up to 75,000 AF of water annually. *See* USBR AR 011728-29. (Collectively, these three plaintiffs are referred to as the "Stanislaus River Plaintiffs" or "SR Plaintiffs.")

3. The Status of Steelhead in the Stanislaus River.

The OCAP BA summarizes the history and status of Steelhead in the Stanislaus River:

> Historically, steelhead distribution extended into the headwaters of the Stanislaus River (Yoshiyama *et al.* 1996). Dam construction and water diversion for mining and irrigation purposes began during and after the Gold rush. Goodwin Dam, constructed in 1913, was probably the first permanent barrier to significantly affect Chinook salmon

access to upstream habitat. Goodwin Dam had a fishway, but Chinook could seldom pass it. Steelhead may have been similarly affected. The original Melones Dam, completed in 1926, permanently prevented access to upstream areas for all salmonids. Currently, steelhead can ascend over 58 miles up the Stanislaus River to the base of Goodwin Dam. Although steelhead spawning locations are unknown in the Stanislaus, most are thought to occur upstream of the City of Oakdale where gradients are slightly higher and more riffle habitat is available.

The Fishery Foundation of California (Kennedy and Cannon 2002) has monitored habitat use by juvenile steelhead/rainbow since 2000 by snorkeling seven sites from Oakdale to Goodwin Dam every other week. Steelhead fry begin to show up in late March and April at upstream sites, with densities increasing into June and distribution becoming more even between upstream and downstream sites through July. Beginning in August and continuing through the winter months, densities appeared highest at upstream sites (Goodwin to Knights Ferry). Age 1-plus fish were observed throughout the year with densities generally higher at upstream sites (Goodwin to Knights Ferry). Low densities were observed from late December until April. It is unknown whether fish left the system in December or if, with the cooler winter water temperatures, they were less active and more concealed during the day.

Since 1993, catches of juvenile steelhead/rainbow in rotary screw traps (RSTs) indicate a small portion of the Stanislaus River steelhead/rainbow population displays downstream migratory characteristics at a time that is typical of steelhead migrants elsewhere. The capture of these fish in downstream migrant traps and the advanced smolting characteristics exhibited by many of the fish indicate that some steelhead/rainbow juveniles might migrate to the ocean in spring. However, it is not known whether the parents of these fish were anadromous or fluvial (they migrate within freshwater). Resident populations of steelhead/rainbow in large streams are typically fluvial and migratory juveniles look much like smolts. Further work is needed to determine the parental life histories that are producing migratory juveniles. The Stanislaus River Weir has been installed annually since 2003 at RM 31.4. The primary purpose of the weir[] is to monitor escapement of fall-run Chinook salmon, so it is installed from September through June each year. Fish passing the weir are monitored using a Vaki infrared RiverWatcher Fish Counter. From 2003 through 2007, O. mykiss have been observed passing the weir a total of 16 times. Scale analysis of one individual indicated that it was a steelhead.

Smolts have been captured each year since 1995 in RSTs at Caswell State Park and at Oakdale (Demko *et al.* 2000). Captures occurred throughout the time the traps were run,

> generally January through June. Most fish were between 175 and 300 mm at the Caswell site, with only six fish in seven years less than 100 mm. Larger numbers of fry were captured upstream at Oakdale. During 2001, 33 smolts were captured at Caswell and 55 were captured at Oakdale, the highest catch of all years. Although improved traps were used, the higher catch in 2001, was likely due to more fish present and not due to better trap efficiencies (Doug Demko, personal communication, 2001). RSTs are generally not considered efficient at catching fish as large as steelhead smolts and the number captured is too small to estimate capture efficiency so no steelhead smolt outmigration population estimated has been calculated.

USBR AR 007670-71.

The BiOp describes the impacts of proposed operation of New Melones on survival of CV steelhead and its critical habitat, BiOp at 296-313, and imposes a number of RPAs that affect the New Melones Unit.

- Action III.1. – Establishes a real-time operational decision-making team, the Stanislaus Operations Group ("SOG"), to "provide direction and oversight to ensure that the East Side Division actions are implemented, monitored for effectiveness and evaluated." *Id.* at 620.
- Action III.1.2 – Requires Reclamation to make releases from New Melones to achieve specified water temperatures at two locations downstream of Goodwin Dam. Temperature compliance is to be measured on a seven-day average daily maximum temperature. *Id.* at 620-22.
- Action II.1.3 – Requires Reclamation to release water pursuant to a year-round minimum flow schedule, dependent on hydrologic year time, to "optimize CV steelhead habitat for all life history

stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on [the] declining limb of [the] pulse." *Id.* at 622; BiOp App. 2-E.

- Action III.2.1 – Calls for the addition of 50,000 cubic yards of gravel to improve spawning habitat by 2014, and 8,000 cubic yards per year for the duration of the Project Actions. BiOp at 626-27.
- Action III.2.2 – Requires Reclamation, with advice from SOG, to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. A proposed plan shall be submitted by June 2011. If NMFS approves the plan, Reclamation will begin to implement it in 2012. *Id.* at 627.
- Action III.2.3 – Requires Reclamation, in cooperation with SOG, to develop a list of projects to improve the habitat values of freshwater migratory habitat in the Stanislaus River. *Id.* at 627-28.
- Action III.2.4 – Requires an evaluation of options to enable steelhead to pass New Melones, Goodwin, and Tulloch dams in order to access their historic habitat. A report detailing options is to be prepared by December 13, 2016. *Id.* at 628.
- Action IV.2.1 – This Delta action, a part of which is discussed above, requires Reclamation to release water from New Melones, in

addition to the minimum flow schedule set forth in Appendix 2-E, to meet certain flow requirements at Vernalis. This requirement is valid through 2011. At that time, it is anticipated that the SWRCB will establish minimum flows for the San Joaquin River. BiOp at 642-43. There is no information about such minimum flows or whether they have been established.

SR Plaintiffs raise a number of challenges to the treatment of New Melones in the BiOp, its effects analysis, and RPAs related to New Melones.[33]

B. Inclusion of the New Melones Unit in the Proposed Action Subject to Consultation.

SR Plaintiffs challenge NMFS's decision to include the New Melones Unit in the action subject to consultation. The ESA's consultation requirement applies to "agency actions." *See* 16 U.S.C. 1536(a)(2). The ESA implementing regulations define "action" to mean "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." 50 C.F.R. § 402.02. No regulation defines the scope of the action to be considered. The question is whether NMFS's definition of the scope of the action is reasonable in light of the record. *See PCFFA*, 426 F.3d at 1090 ("Even when an agency explains its decision with less than ideal clarity, a reviewing court will not

[33] SR Plaintiffs' motion suffers from a lack of internal organization, repeatedly shifting back and forth between challenges to the effects analysis and challenges to the RPA, making evaluation of the merits of their arguments unnecessarily time consuming and difficult.

upset the decision on that account if the agency's path may reasonably be discerned.").

SR Plaintiffs make two attacks on NMFS's decision to include New Melones in the Project Description. They first argue that the touchstone of inclusion in the action appears to be "coordination" of the Unit in question with Project operations. For example, the SWP is included in the action because its operations are closely coordinated with those of the CVP through the Coordinated Operating Agreement. BiOp at 31; USBR AR 007495 (BA 1-4) ("SWP operations are coordinated with CVP operations and, as such, are consulted on as part of the proposed action described in the BA."). In contrast, the Friant Unit was deliberately excluded from the action because it operates separately from the rest of the CVP and is not integrated into the CVP OCAP." BiOp App. 1 at 79. SR Plaintiffs argue that while "New Melones is an element of the CVP, it is also clear that operation of New Melones is not coordinated with the operation of the rest of the CVP and/or SWP." Doc. 454 at 37. This assertion is belied by the record. Stanislaus Plaintiffs admit that New Melones is one of the major reservoirs in the CVP system and releases from it are needed to meet non-consumptive downstream purposes, such as water quality and the preservation and enhancement of fish and wildlife in both the Stanislaus and San Joaquin rivers. *Id.* at 37-38; *see also* Sixth Milligan Decl., Doc. 517 at ¶ 10 (explaining that "[r]eleases from New Melones down the Stanislaus River affect Reclamation's ability to

comply with Vernalis flow and water quality requirements.").

SR Plaintiffs also argue that inclusion of New Melones in the action subject to consultation will lead to "absurd results" because the Incidental Take Statement provides that the RPAs must be implemented as a whole and if Reclamation and/or DWR fail to comply with the terms of the ITS, they may no longer comply with the ESA. *See* BiOp at 728. SR Plaintiffs maintain that this is "absurd given the lack of coordination" between New Melones and other operations of the CVP and SWP. Doc. 454 at 38. "Simply put, what happens on the Sacramento River as a result of actions taken by the CVP and/or SWP has nothing to do with the listed species contained in the Stanislaus River, and vice-versa." *Id.* This statement is incorrect. Mr. Milligan opines: "during balanced conditions, releases from New Melones down the Stanislaus River affect overall Delta conditions, which potentially play a role in determining how Reclamation operates the rest of the CVP.... Therefore [Reclamation] typically coordinate[s] operations of the various Delta facilities and CVP reservoirs, including New Melones Reservoir ... with DWR in its operation of the SWP, on a daily basis." Sixth Milligan Decl., Doc. 517 at ¶ 10. SR Plaintiffs have presented no contrary evidence.

SR Plaintiffs' motion for summary judgment that Federal Defendants erred by including New Melones in its coordinated Project description is DENIED. Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

C. Effects Analysis Challenges.

1. New Melones Operations v. Baseline Effects.

SR Plaintiffs argue that the BiOp is unlawful because NMFS improperly identified as "effects of the action," effects caused by the existence of New Melones Dam. Doc. 454 at 18-21. Specifically, SR Plaintiffs point to the BiOp's conclusions that the action (1) altered flows, which impact habitat conditions and survival at various life history stages, and (2) modified the hydrograph to dampen peak flood flows, mute flow variability, and reduce or eliminate channel forming flows. *Id.* at 19. SR Plaintiffs maintain that "[t]hese are effects associated with the fact that the dam exists, rather than effects associated with the operational plan." *Id.* at 20. SR Plaintiffs' seminal argument is that NMFS has "failed to identify with any clarity how continued operations, as opposed to the basic existence of the dam itself, cause any additional incremental harm to steelhead, deepen their jeopardy, or otherwise 'tip' them into extinction." Doc. 454 at 20.

The record does explain how continued operations will cause additional incremental harm. The BiOp compares effects of the action both to pre-dam "unimpeded" conditions and to the "future baseline" which includes the existence of the dams:

> The future baseline of the existing dams prevents access to historical habitat, but the proposed operations of the dams control the quality and quantity of available alternative habitat below Goodwin Dam and the suitability of the physical conditions to support CV steelhead at various life history stages. Survival of CV steelhead may be affected by operations of the East Side Division in the following ways:

• Operational releases control extent of cool water habitat available below Goodwin Dam.

• Operational release levels control the quantity and functionality of instream habitat for spawning, egg incubation, juvenile rearing and smoltification.

• Operational releases are typically lower than unimpaired flows, requiring smolting juveniles to expend more energy to outmigrate and lower stream velocities increase the exposure of juveniles and smolts to predation.

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The proposed New Melones operations will create an altered hydrograph as compared to the unimpaired flows and as compared to the future baseline. The dampening of flood events and freshets eliminates the geomorphic processes that are important to CV steelhead to replenish and rejuvenate spawning riffles and to inundate floodplain terraces to provide nutrients and rearing habitat for juvenile salmonids. The Corps has limited controlled flood releases from New Melones Dam to 8,000 cfs. The dampening of flood events also eliminates or reduces the intensity and duration of freshets and storm flows that would otherwise convey smolting CV steelhead to the ocean and create a clear signature for the river. A more moderated hydrograph has eliminated periodic channel forming flows. The dams (a future baseline condition) capture sediment that would otherwise be transported downstream for geomorphic processes. Operations of the dams result in channel incision that further reduces the chance of inundated floodplain habitat and degrades spawning habitat quality. Releases from New Melones can affect downstream temperatures at critical times to affect adult migration, spawning, egg incubation success, juvenile survival and anadromy. Predicted increases in temperature as a result of climate change will affect instream water temperatures directly, and will affect New Melones operations as more precipitation will fall as rain, rather than snow, and as storm event intensity is expected to increase. Climate change may affect the types and cover rates of vegetation upslope of the river, potentially increasing the rate of fine sediment transport to the river and to spawning areas. Future baseline stressors that are exacerbated by the proposed East Side Division operations include increased vulnerability to non-native fish predators

> owing to flow velocities and downstream temperatures conducive to these species and competition from resident O. mykiss, which may be more abundant as a result of less variability in instream conditions.

BiOp at 300-301 (emphasis added). The subsequent pages provide more specific support for these conclusions. *Id.* at 302-309.

SR Plaintiffs specifically challenge only one aspect of this analysis; NMFS's reliance on a 2001 Kondolf, *et al.* study to support the assertion that available steelhead spawning gravel habitat decreased 40% since 1994. BiOp at 308. Kondolf, et al. (2001) concluded that spawning gravel habitat decreased 40% between 1972 and 1993, and thereafter decreased by a smaller percentage, within the study's margin of error, between 1993 and 2000, excluding gravel augmentation efforts. The significance of this minor error to SR Plaintiffs' argument is unclear. The BiOp does not specifically attribute this 40% loss to Project operations. Rather, later in the same paragraph, NMFS explains with specificity the ongoing impact of dam operations:

> Operational criteria have resulted in channel incision of 1-3 feet since the construction and operation of New Melones Reservoir (Kondolf *et al.* 2001). This downcutting, combined with operational criteria, have effectively cut off overbank flows which would have inundated floodplain rearing habitat, as well as providing areas for fine sediment deposition, rather than within spawning gravels, as occurs now. Additionally, the flow reductions in late spring and early summer are too rapid to allow recruitment of large riparian trees such as Fremont cottonwoods. Consequently, within 10 to 20 years as existing trees senesce and fall, there will be no younger riparian trees to replace them, resulting in less riparian shading, higher instream temperatures, less food production from allochtonous sources, and less LWD for nutrients and channel complexity[.]

BiOp at 308.

SR Plaintiffs do not dispute the science underlying this conclusion, nor do they suggest that the impacts of operations, per se, are *de minimis*. Rather, they argue that the real issue is whether the amount of New Melones water within Reclamation's discretion is significant enough to cause appreciable harm to CV Steelhead and/or appreciable diminishment of its critical habitat. *See* Doc. 492 at 4-6. The median historical unimpaired runoff in the Stanislaus River Basin is 1.1 million acre feet per year ("MAFY"). BiOp App. 1 at 69. OID and SSJID are legally entitled to the first 600,000 AF. USBR AR 011751-53. In addition, Reclamation must release between 98,300 and 302,000 AF for fish pursuant to its agreement with CDFG. BiOP App. 1 at 71. Additional releases may be required to meet dissolved oxygen criteria and D-1641. BiOp App. 1 at 72-73, 76-77.[34]

Federal Defendants concede that these mandatory delivery requirements do exist, but emphasize that Reclamation nonetheless possesses discretion over how those releases are made. *See* Doc. 515 at 49. For example, while OID and SSJID have an entitlement to 600,000 AF, past water use data demonstrates that this full amount is not always requested, which in turn changes the amount of water

[34] SR Plaintiffs mention further legal constraints on the Bureau's use of water set forth in the September 30, 2009 Federal Circuit Ruling, *Stockton E. Water Dist. v. United States*, 583 F.3d 1344 (Fed. Cir. 2009), which post-dates the June 4, 2009 issuance of the BiOp by several months. *See* Doc. 492 at 6 (discussing holding that Reclamation does not have discretion to breach SEWD CVP contract to comply with the ESA). Those subsequent constraints and their future effects do not apply to the reasonableness of the BiOp when issued.

available for other beneficial uses. *See* Hilts Decl., Doc. 480, Ex. 1 (showing that during the 1987-1992 drought, OID and SSJID never requested full allocation). In addition, Reclamation has the ability to request temporary exemptions from SWRCB conditions such as for dissolved oxygen and Vernalis flow objectives when warranted, and assumptions to reflect this option were inserted into the CalSim II modeling for the Stanislaus River. Fifth Milligan Decl., Doc. 479 at ¶¶ 7-8; Hilts Decl., Doc. 480 at ¶ 12. Defendants do not suggest these are not *Home Buidlers* non-discretionary obligations on Reclamation.

SR Plaintiffs argue that NMFS must independently demonstrate that discretionary operations alone satisfy the jeopardy/adverse modification standard. This contention was rejected above. The ESA does not require the agency to segregate discretionary from non-discretionary impacts for the purposes of the effects analysis. (Whether an agency can implement an RPA within its legal authority if an insufficient amount of discretionary water is available is a different question.) Given that there is some discretionary water in the New Melones system and that Reclamation authority over how make discretionary deliveries, is there enough discretionary project water to cause appreciable harm to the species?

The BiOp identifies several negative impacts caused by Project operations, including increasing the likelihood that CV Steelhead will be exposed to unfavorable temperatures at various life stages and, by

lowering instream flows, the amount of energy juveniles and smolts must expend to avoid predation is increased. BiOp at 301. SR Plaintiffs do not challenge these underlying findings. The BiOp does not have to demonstrate that these negative effects, alone, satisfy the jeopardy standard by "reduc[ing] appreciably the likelihood of both the survival and recovery of [the] listed species in the wild by reducing the reproduction, numbers, or distribution of that species." Rather, the jeopardy analysis must determine the overall impact on the species of the entire project, not just the New Melones unit. *See* 50 C.F.R. § 402.14 (NMFS's obligation during formal consultation is to determine "whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of the listed species or result in the destruction or adverse modification of critical habitat").

SR Plaintiffs' motion for summary judgment that the BiOp's effects analysis is unlawful because it does not properly distinguish between baseline effects and effects of the action is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED on this issue.

2. Challenge to Critical Habitat Adverse Modification Finding.

SR Plaintiffs complain that NMFS has not specifically identified how the proposed action will cause "adverse modification" to the steelhead's critical habitat. Doc. 492 at 7-9.[35]

[35] Defendant-Intervenors and Federal Defendants suggest that SR Plaintiffs' opening

a. Spawnable Area.

SR Plaintiffs first challenge aspects of the BiOp's treatment of the "spawnable area" aspect of CV Steelhead critical habitat. Doc. 492 at 8. The BiOp found that steelhead spawning habitat would be "maximized" if instream flows were maintained at 200 cfs. However, operations for the protection of fall-run Chinook require higher flow rates may "conflict" with the needs of steelhead. BiOp at 311. SR Plaintiffs argue that habitat "maximization" is not a requirement of the ESA and is not relevant to the effects analysis. Doc. 492 at 8. NMFS does not explain why it set the benchmark for evaluating project impacts at the spawning habitat "maximum." To ascertain whether project operations will impact the likelihood of CV steelhead survival and recovery, the more appropriate benchmark is that amount of habitat that is "essential" for survival and recovery. The BiOp does not identify the extent of this "essential" habitat or how it relates to the "maximum" habitat. The use of the "maximum" habitat benchmark necessarily resulted in a finding of adverse modification to this aspect of CV habitat. That finding is not justified.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's findings regarding spawnable area is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are

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brief failed to challenge NMFS's determination that the actin would adversely modify CV steelhead critical habitat. Doc. 484 at 88 & Doc. 515 at 53. However, although the critical habitat analysis was not a direct subject of discussion in SR Plaintiffs' opening brief, that brief did directly challenge the effects analysis regarding the Stanislaus River, which includes both effects on the species and critical habitat. Defendant-Intervenors' discussion of critical habitat as an alternative justification for the RPAs, Doc. 484 at 82-85, invites SR Plaintiffs' discussing critical habitat in reply.

DENIED.

b. Spawning Gravel Quality and Quantity.

SR Plaintiffs dispute the BiOp's findings related to "Spawning Gravel Quality and Quantity." The entire section on this topic provides:

> Pebble counts and sediment size analysis of spawning areas has shown an increase in sand and fine material in spawning beds since construction of New Melones Dam (Kondolf *et al.* 2001, Mesick 2001). Most non-enhanced riffles had sufficient fine material to impair egg incubation and survival.
>
> Gravel replenishment actions below Goodwin Dam add suitably-sized gravel for CV steelhead spawning, but it is rapidly mobilized at flows as low as 280 cfs (Kondolf *et al.* 2001). CVPIA spawning gravel additions have targeted 3,000 cubic yards per year. This is not of sufficient volume to offset the deficits created by the loss of recruitment from upstream sources (over 1 million cubic yards, Kondolf *et al.* 2001). At best, these additions may strategically maintain the quality of few spawning riffles. The project description does not specify a level of spawning gravel addition to be performed on the Stanislaus River.

BiOp at 311. SR Plaintiffs contest the BiOp's reliance on the 2001 Kondolf, *et al*. study to find that an increase in fine material in spawning beds since the construction of New Melones impairs egg incubation and survival. *Id*. at 311. Federal Defendants acknowledge that the loss of gravel recruitment from upstream sources is not the result of the proposed action. *See* Doc. 515 at 51. However, Federal Defendants argue that "continuing discretionary flow releases eliminates the variability which replenishes spawning riffles," *id.*, citing page 301 of the BiOp, which discusses how "[t]he dampening of flood events and freshets eliminates the geomorphic processes that are important to CV steelhead to replenish and rejuvenate spawning riffles

and to inundate floodplain terraces to provide nutrients and rearing habitat for juvenile salmonids." Page 301 includes this finding, but the section of the BiOp challenged by SR Plaintiffs, at page 311, specifically discusses gravel recruitment (i.e. the volumes of gravel present), not "riffle rejuvenation." There is no record evidence that loss of gravel recruitment is an effect of the action. This effect is completely without support and the purported impact of any changed analysis on the overall critical habitat discussion must be addressed by NFMS on remand.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's finding that New Melones operations effect gravel recruitment is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED on this issue.

c. Challenge to Temperature Requirements for Spawning Habitat.

SR Plaintiffs also purport to challenge the BiOp's finding regarding "degradation of rearing habitat conditions," but actually advance arguments about temperature requirements for spawning habitat. *See* Doc. 492 at 9. The BiOp explains that "[b]ecause CV steelhead are unable to reach their historical spawning areas above Goodwin Dam, they are dependent on East Side Division operations maintaining temperatures suitable for spawning below the dam..." and concludes that appropriate temperature conditions likely cannot be met for April and May for future operations. BiOp at 310. SR Plaintiffs argue "NMFS fails to explain whether or not these 'temperature conditions'

will be met with the proposed operations or whether there is any evidence that temperatures, as the result of existing operations, have been detrimental to steelhead." Doc. 492 at 9. This argument entirely ignores the four-and-a-quarter page discussion of temperature at BiOp pages 302 through 306, discussing results of computer modeling showing that project operations will result in temperature exceedances that will have detrimental effects on certain life stages of CV steelhead in the Stanislaus. This challenge is without merit.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's findings regarding New Melones operations' impacts on temperature conditions in spawning habitat is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED on this issue.

d. Freshwater Migration Corridors.

SR Plaintiffs challenge the BiOp's finding that proposed operations will negatively affect upstream and downstream migration corridors. The relevant section of the BiOp provides:

> Under proposed operations the freshwater migration corridors on the Stanislaus River will continue to require juvenile CV steelhead to pass through predator-rich abandoned mining pits, incised channels that limit channel complexity and water temperatures that may be physiologically lethal or sublethal. The spring pulse flows defined in VAMP are generally less than the spring pulse flows measured in 1989, a critically dry year (Kondolf *et al.* 2001), hence the operational assistance provided to assist CV steelhead outmigrants is only representative of the lowest migratory volumes historically experienced by CV steelhead.
>
> Channel incision resulting from post New Melones operations has produced overhanging large wood and river edge aquatic vegetation but the lack of scouring and channel forming

> flows has effectively channelized and simplified the corridor. The variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner has been limited by operational conditions. Obstruction of access to historic spawning and rearing habitat requires CV steelhead to utilize these freshwater migration corridors at times that may not be optimal with respect to temperature, forage availability and exposure to predators.
>
> Adult CV steelhead migrating upstream frequently are delayed entering the river owing to poor water quality conditions in the Delta. Fall attraction flows released for Fall Run typically improve conditions for steelhead migration also, hence steelhead tend to be observed on the Stanislaus River earlier in the year than in other Central Valley streams.

BiOp at 312-13. SR Plaintiffs argue "there is nothing in the AR that indicates that existing operations have negatively affected upstream or downstream migration to begin with, let alone that future operations will 'continue' to do so." Doc. 492 at 9. SR Plaintiffs' argument continues:

> ...[T]he AR reveals that as to fall attraction, existing pulse flows for fall-run salmon appear to also attract steelhead (BO at 625). Nonetheless, NMFS imposes additional fall pulse-flows to attract steelhead. (BO at 624). For out-migration, the BO explains that steelhead are larger than fall-run smolts and may be less dependent on pulse flows to convey them out of the Stanislaus River (Id.). Without any evidence that the existing population of steelhead in the Stanislaus River that has been unable to outmigrate due to impaired flows, the BO states that the late spring flows in Action III.1.3 are needed to "allow more smolted fish to migrate out of the system."

Doc. 492 at 9. The pages cited by SR Plaintiffs are from the section of the BiOp discussing the need for the RPA Actions. SR Plaintiffs do not challenge the clearly explained conclusions of the effects section. Project operations reduce spring pulse flows to levels that are below normal migratory flows, and the flow regime implemented by Reclamation under the action results in channel incision, which

reduces connection to floodplain areas necessary for steelhead to rear to large enough size to begin the smolting process. BiOp at 312-13.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's finding that New Melones operations effect downstream migration corridors is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

D. Stanislaus River RPA Challenges.

1. Challenge to the Assumptions Used to Model New Melones Project Operations.

SR Plaintiffs' claim that NMFS used a flawed project description for New Melones and that this "fundamental error renders the entire consultation for the New Melones unit erroneous." Doc. 454 at 17. This objection concerns the assumptions used to represent New Melones operations in computer modeling.

In 1997, Reclamation and FWS adopted an Interim Plan of Operations to guide the annual operations for New Melones ("NMIPO"). Although the NMIPO was only a two-year plan, it is still used today as an operational guide. USBR AR 0007573-74. Reclamation has deviated from NMIPO in recent years to provide more water to meet State Water Resources Control Board ("SWRCB") conditions and fulfill CVP Contracts, USBR AR 0007575. The 2008 OCAP BA described the modified operating plan that was the subject of consultation as a "Transitional Operating Plan" ("TOP"). *See* USBR AR 0007513. The TOP differs from the NMIPO in several ways, which are described in Table 2-11 of the BA. USBR AR 0007576. SR Plaintiffs note that under the NMIPO,

allocations to CVP contractors are capped at 90,000 af, while under the TPO Reclamation provides for the full 155,000 AF allocation in "high allocation years." *Id.*

It is undisputed that NMFS used the TOP as the basis for its effects analysis. *See* Doc. 477-1 at 119; Doc. 492 at 4. SR Plaintiffs object instead to NMFS's decision to use the NMIPO assumptions to model RPA options. NMFS elected to use the NMIPO assumptions after it concluded that the TPO would not provide sufficient water for fishery needs in 59% of years. BiOp at 306. The BiOp explained that a 1993 study by Aceituno applied the so-called "instream flow incremental methodology" to the Stanislaus River between Riverbank and Goodwin dam and "determined that 155 TAF was needed to maximize weighted usable habitat area for salmon, not including outmigration flows or fall attraction flows." *Id.* The BiOp then determined that the proposed allocation strategy for the East Side Division under the TPO only commits to providing this level of water for fisheries in 41 percent of years (meaning insufficient supplies would be present in 59% percent of years). *Id.*

SR Plaintiffs assert in a footnote that this conclusion is "bogus" because NMFS did not explain to "[w]hich fisheries" it was referring, nor how much water is "sufficient." Doc. 492 at 4 n. 4. More importantly, the BiOp nowhere explains why it is "essential" to achieve flows designed to "maximize" steelhead habitat area. Is the status of the species so dire that improvement to 60, 70, 80, or 90%

of the "maximum" would be insufficient, even if that marginal difference from the maximum saved large amounts of water? The record provides no explanation of the decision to aim for "maximum" habitat in a system of limited resources. This must be specifically addressed and explained on remand.

NMFS admits that the modeling used to support the RPA builds upon this unexplained decision to set a "maximum habitat" goal. Doc. 477-1 at 119. The agency's own internal guidance requires an explanation why operating to this goal is "essential." None is provided. It is impossible to determine how a change in this goal impacts the overall rationale for the RPA. This too must be addressed on remand.

SR Plaintiffs' motion for summary judgment that Federal Defendants erred by modeling RPA actions based on inappropriate assumptions is GRANTED. Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

2. Do Actions III.1.2, III.1.3, and IV.1.2 Improperly Require Reclamation to Infringe Upon OID and SSJID's Prior Right to Stanislaus River Water in violation of 50 C.F.R. § 402.02?

"Reasonable and prudent alternatives refer to alternative actions identified during formal consultation [1] that can be implemented in a manner consistent with the intended purpose of the action, [2] that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, [3] that [are] economically and technologically feasible, and [4] 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 (the "four RPA requirements").

SR Plaintiffs claim that Actions III.1.2, III.1.3, and IV.1.2 exceed Reclamation's legal authority because they require Reclamation to infringe upon OID and SSJID's prior (superior) water rights in the Stanislaus River. It is undisputed that OID and SSJID hold perfected water rights to Stanislaus River water that are senior to Reclamation's rights to divert from the Stanislaus. OID and SSJD receive water from New Melones under a 1988 Agreement with the United States designed to fulfill their prior rights. USBR AR 0007571-72; USBR AR 0011751. That agreement requires Reclamation to provide to OID and SSJID:

- The inflow into New Melones plus the amount derived by the formula of (600,000 minus inflow) divided by 3, not to exceed 600,000 AF per year, USBR AR 011751; and
- The right to conserve up to 200,000 AF in New Melones, USBR AR 011752.

SR Plaintiffs point to studies in the record that they claim indicate the RPAs will require Reclamation to short OID and SSJID 13,000 AF on average. AR 00219154. They maintain that this is actually an under-estimate of the amounts they will be shorted under the Stanislaus River RPA Actions because of certain of NMFS's modeling assumptions. Specifically, the modeling assumed:

> (1) OID and SSJID's senior water rights would be shorted;
>
> (2) non-compliance with a Court order to limit non-flood flows to no more than 1500 cfs
>
> (3) relaxation of dissolved oxygen ("DO") requirement that is a condition of Reclamation's water right for New Melones;
>
> (4) a successful petition to the SWRCB to relax D-1641 salinity requirements at Vernalis; and
>
> (5) a successful petition to the SWRCB to relax D-1641 flow requirements at Vernalis.

Doc. 492 at 13.

Neither the underlying study purportedly demonstrating that water rights will be shorted, nor the inclusion of the listed modeling assumptions require Reclamation to short senior water rights or demonstrated that it is likely they will be unable to comply with the RPA without doing so. The study cited by SR Plaintiffs was restricted to modeling two years, 2010-2011, when the Phase I requirements of Action IV.2.1 were in place. AR 00219154. Reclamation complied with the RPA during this period and there is no indication that Reclamation shorted senior water rights. More to the point, neither NMFS nor the Bureau has discretion to violate these water rights. It is inappropriate to speculate they will break the law.

As for the modeling assumptions, each is justified based on past practice and experience and has long been included in the CALSIM II modeling process. The Calsim II model inputs do not assume that OID and SSJID's rights will be shorted. They cannot be. Rather, the RPAs assume that demand from these districts will be reduced under certain circumstances, based upon land use projections developed by the

California Department of Planning and Local Assistance. Hilts Decl., Doc. 480 at ¶ 6 ("hydrology-land-use-demand input [data] set ... was best available... [and] suggest that OID and SSJID will not use their full entitlement in most years"); Fifth Milligan Decl., Doc. 479 at ¶ 5 (SR Plaintiffs' expert Mr. Steiner participated in 2005 update of land use demand assumptions, which were used in the BA and relied upon in the BiOp). In addition to the land-use based assumptions, the relevant modeling included assumptions designed to reasonably reflect water usage by the Stanislaus basin stakeholders during sustained dry periods. Hilts Decl., Doc. 480 at ¶ 10.

SR Plaintiffs cite a number of cases in which mitigation measures were deemed unsatisfactory to satisfy an agency's burden to insure against jeopardy because those measures were not "reasonably specific, certain to occur, [] capable of implementation, [and] subject to deadlines or otherwise-enforceable obligations...." *Ctr. for Biological Diversity v. Rumsfeld*, 198 F. Supp. 2d 1139, 1152-54 (D. Ariz. 2002). But, the cases cited are distinguishable, and it is unclear whether the "reasonably certain to occur" language should be applied to RPAs. *Rumsfeld* concerned a biological opinion's "no jeopardy" finding that relied upon the action agency to mitigate groundwater impacts of its activities through participation in a regional plan to protect groundwater resources, despite the fact that the action agency had no authority to ensure the regional plan was implemented. Nor did the biological opinion set any goals or

deadlines regarding groundwater protection. *Rumsfeld* reasoned that necessary mitigation measures designed to prevent adverse impacts to groundwater must be identified and included either in the proposed action or as RPAs. *Id.* at 1154. Without these adjustments there was no rational basis for the "no jeopardy conclusion." *Id.* *Rumsfeld* address the requirements for mitigation measures, not RPAs. *See also NWF v. NMFS*, 254 F. Supp. 2d 1196, 1213-14 (D. Or. 2003) (requiring reasonable certainty when NMFS relied upon off-site federal actions to conclude that jeopardy will not occur).

Rumsfeld relied upon *Sierra Club v. Marsh*, 816 F.2d 1376 (9th Cir. 1987), which addressed whether an agency was required to reinitiate formal consultation after failing to acquire certain mitigation lands. Those lands were considered a "vital" RPA by FWS in its biological opinion concerning the agency's action. *Id.* at 1378. Marsh explained that the "reasonably certain to occur" standard applies to "[i]ndirect effects ... caused by the proposed action," not to RPA actions. *See id.* at 1388 (citing 50 C.F.R. § 402.02). Rather, *Marsh* applied the regulatory criteria from 50 C.F.R § 402.16 to determine whether the action agency unlawfully failed to reinitiate consultation. *Id.* at 1388-89.

Even if reasonable certainty is the benchmark, it is satisfied here. The RPAs in question here require Reclamation to use its own water resources for particular purposes. Reclamation has reasonably examined past patterns of Project water use by third parties and

concluded that water will be available to implement the RPAs. *See S.W. Ctr. for Biological Diversity v. U.S. Bureau of Reclamation*, 143 F.3d 515, 518-19 (9th Cir. 1988) (upholding generalized RPA requiring agency to protect 1,400 acres without identifying the particular location or timeframe). SR Plaintiffs have not demonstrated that reliance on past practice is unreasonable. If, however, Reclamation's predictions prove incorrect and make the RPAs' implementation infeasible, the burden cannot be imposed on senior water rights holders. Rather, Reclamation must then re-initiate consultation.

Federal Defendants have reasonably explained the remaining modeling assumptions about acquisition of waivers from the SWRCB regarding dissolved oxygen and D-1641 flow and salinity requirements. Fifth Milligan Decl., Doc. 497 at ¶ 7-8; Hilts Decl., Doc. 48 at ¶ 12 (explaining it is "reasonable to assume the SWRCB will take a holistic approach and grant such petitions" under relevant conditions). This is speculation and may be mistaken, however the law does not require more. If no Petitions are granted, absent available existing water, NMFS must reinitiate consultation. SR Plaintiffs have not demonstrated that these assumptions were clearly erroneous.

SR Plaintiffs' final challenge to the modeling assumptions is based on a March 10, 1982 injunction imposed in *United States v. California*, purportedly requiring Reclamation to limit non-flood flows to no more than 1,500 cfs. It is undisputed that Action III.1.3 calls for spring pulse flow releases as high as 5,000 cfs, BiOp at

623, Fig. 11-1, and Action IV.1.2 requires releases from New Melones to meet higher Vernalis flow rates, BiOp at 642.

The Ninth Circuit's March 10, 1982 injunction "pending determination of appeal," required the United States to provide the State of California with a plan to protect downstream property from damage caused by inundation or seepage. SR Plaintiffs' Request for Judicial Notice ("SRJN"), Doc. 453-7, Ex. 7 at 2. That plan, set forth in a February 1982 memo drafted by the Bureau, indicated that flows above 1,500 cfs would "create water tables high enough to have the potential to damage the almond and walnut orchards adjacent to the [Stanislaus] river." *Id.*, Ex. 8, at 1.[36] But, the injunction, by its own terms, was limited to the time period pending appeal. The appeal was decided nine months later on December 20, 1982. 694 F.2d 1171 (9th Cir. 1982). The Ninth Circuit's remanded with instructions that "[t]he injunction previously issued by the court may be modified or amended by the district court as it deems necessary and appropriate in view of this opinion and the present circumstances of the dam and its storage facility," *id.*, but there is no evidence in the record that the district court ever imposed a similar 1,500 cfs ceiling on non-flood flows. NMFS reasonably concluded that the limitation no longer applies and could be omitted from Stanislaus River modeling.[37] This

[36] Both SRJN Exhibit 7 and 8 are public records subject to judicial notice for their content. *San Luis Unit Food Producers v. United States*, 77 F. Supp. 2d 1210, 1216 n.1 (E.D. Cal. 2011).

[37] SR Plaintiffs cite a May 2009 Memo authored by NMFS's Rhonda Reed, which discussed the purported 1,500 non flood flow limit:

is not the appropriate forum for SR Plaintiffs to attempt to enforce a nineteen-year-old injunction, which has no continuing validity.

SR Plaintiffs' motion for summary judgment that the RPA improperly requires Reclamation to infringe on OID and SSJID's prior rights to Stanislaus River water is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

3. Use of the San Joaquin River Temperature Model.

Federal agencies must use "the best scientific and commercial data available" in developing reasonable and prudent alternatives. 16 U.S.C. § 1536(a)(2); 50 C.F.R. §402.14(g)(8). SR Plaintiffs assert that Federal Defendants did not use the best available science in formulating the Stanislaus River RPAs because they did not model the feasibility of the RPAs using the San Joaquin River Water Temperature Model ("SJRWTM").

There is no dispute that temperature modeling is critical to the management of the Stanislaus River and to implementation of the Stanislaus River RPAs. NMFS relied on Reclamation's "USBR Temperature Model," to run an operational scenario involving a draft RPA for new

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> Issues raised were his understanding that Reclamation couldn't exceed 1500 cfs because of seepage. Roger Guinee pointed out that the 1500 cfs cap related to a ruling in a judgment that applied only to the period that New Melones reservoir was filling, and no longer applies (per Jim Monroe, FWS). Kaylee Allen (Reclamation) said she was researching the issue and wasn't sure of outcome. I asked how long it takes for high flows to cause seepage problems. Ron was not definite, but implied about ten days.

AR 105885. SR Plaintiffs erroneously assert that this paragraph indicates that an NMFS scientist, Roger Guinee, offered a "legal opinion" that the injunction no longer applied. In fact, the paragraph states that the legal opinion came from Jim Monroe, a federal government attorney.

minimum flow releases on the Stanislaus. AR 00105890.

SR Plaintiffs' expert, Avery Dotan, opines that no reasonably prudent modeler would choose to use the USBR Temperature Model, which can only simulate the mean monthly vertical temperatures, to assess the feasibility of meeting a seven-day average daily maximum temperature requirement, such as Action III.1.2. *See* Dotan Decl., Doc. 442 at ¶¶ 53-58

The agencies had numerous discussions throughout 2009 regarding temperature modeling, including some specific requests to look into the use of the SJRWTM. *See, e.g.,* AR 00065939 (Feb. 6, 2009 email regarding modeling), 00070965, 00074969 (requesting use of a different model), 00077217 (Feb. 18, 2009 email asking questions about "Derek's model run"), 00077613 (Mar. 20, 2009 inquiry regarding application of the SJRWTM), 00078887 (Mar. 29, 2009 email containing information about SJRWTM), 00079052 (Mar. 27, 2009 email containing information about SJRWTM), 00085078 (Apr. 10, 2009 email asking for assistance from "Don Smith and Avry Dotan" as the "SJR-Basin wide temperature modelers"). CalFed's Science Program held a special workshop on temperature modeling for the BO in April 2008 and advised the agencies to utilize the "latest technology" in temperature modeling, including adopting models with "smaller time-steps to better assess biological effects." AR 00038723. The CalFed Science Review Panel, in reviewing the draft BiOp, specifically recommended that Federal Defendants utilize the SJRWTM, a sub-daily temperature model developed for the

Stanislaus River by Avry Dotan and Resources Management Associates. *See* AR 00219651. Several federal agencies, including NMFS, FWS, and Reclamation, participated in its development. Dotan Decl., Doc. 442 at ¶¶ 6, 23-34. The model was funded by CalFed and peer reviewed by CalFed scientists. *Id.* at ¶¶ 24, 21, 26.

The SJRWTM could have modeled temperatures on a seven-day average daily maximum basis, a more appropriate time scale according to Mr. Dotan. *Id.* at ¶¶ 53, 80. SR Plaintiffs assert that the SJRWTM was the best available science and should have been used to evaluate the feasibility of the RPA actions.

The model runs in the AR using the USBR Temperature Model predict that the new flow requirements in Action III.1.3 will occasionally cause temperatures to exceed the objectives set forth in Action III.1.2. Dotan Decl., Doc. 442 at ¶¶ 73-77. Mr. Dotan opines that these results are unreliable because the model could only predict monthly mean temperatures and was not capable of determining when the seven-day average daily maximum temperature was or was not met. *Id.* at ¶¶ 52-72. To demonstrate that this error is material, Mr. Dotan repeated the analysis using the SJRWTM. The results of this analysis are depicted in Figure 7 to his Declaration, which shows that in February, March, April, May, June, July, August, and September the Bureau's model estimates fewer exceedances than does the SJRWTM. Doc. 441-15. (Mr. Dotan does not discuss the fact that this figure also shows that in October and November, the SJRWTM indicates fewer

exceedances than the Bureau's model. *Id.*)

The SJRWTM model also predicts that the water cost associated with meeting Action III.1.2 vary between 22,000 – 190,000 AF per year with an average cost of 84,000 AF, Dotan Decl., Doc. 442 at ¶ 87; that operating for temperature control will deplete the volume of water in New Melones by as much as 717,000 AF during 1987-1995, *id.* at ¶¶ 86; and that this successive operation for temperature control will eventually cease to be effective as New Melones' pool of cold water is depleted, *id.* at ¶¶ 89.

Federal Defendants do not dispute the superiority of the SJRWTM. Rather, they strenuously object that contemporaneous documents in NMFS administrative record demonstrate that the model was not "available" to the agencies during the consultation. Doc. 477-1 at 131. Although employees of the Federal Defendants were trained to use the model between 2001 and 2009, Dotan Decl., Doc. 442 at ¶¶ 35-42, and Mr. Dotan answered specific questions posed by NMFS and Reclamation regarding the use of model, *see, e.g.,* NAR 00093319 & 00094138, there were concerns that documentation of the complex model was insufficient to allow others to run it, AR 00089101 (May 1, 2009 email indicating "NMFS has the model" but discussing problems with the contract for technical support); AR 00089027 (model in public domain but difficult to run unassisted). The BiOp explains why it did not use the SJRWTM:

> When evaluating the effect on salmonids of an operational strategy on the Stanislaus River, [USBR] would normally take the CalSim modeled results and conduct post-processing to determine temperature effects. When we met in early March to

> discuss the March 3 version of the RPA with the action agencies, we requested help from [USBR] to do temperature modeling on these flows using their tools. In subsequent discussion with USFWS and CDFG, the need to perform temperature modeling on these flows was also identified, but NMFS and USFWS lacked internal expertise to perform the modeling. CDFG was unable to assist with running the San Joaquin River Basin temperature model because of funding freezes. Tetra Tech was hired by NMFS to assist with such activities…[but] [i]nsufficient time was available to them to learn and apply the specifics of the operating model.

AR 00105884.

Record evidence demonstrates that the model was not self-explanatory, even for staff with background in a related model used as the basis for the SJRWTM: HEC-5Q. NMFS had to seek outside help to use the model, and encountered implementation issues. *See* AR 00077320 (NMFS discussing hiring Tetra Tech to help run SJRWTM), 00092267 (NMFS seeking assistance from Bureau engineer with model), 00093101 (NMFS obtaining promise of documentation from FWS), 00093319 (Dotan answering NMFS's questions about application of model), 00093538 (discussing "numerous issues (above and beyond downscaling) with bringing CalSim data into the SJ temp model"), 00094138 (Dotan answering NMFS's questions about application of model). Once NMFS engaged a consultant to run the modeling, the model's other co-developer, Don Smith, resisted providing the assistance necessary to run the model. *See* AR 00089096. In addition, the material provided with the then-available version of the SJRWTM did not allow the model to be correctly utilized. Reed Decl., Doc. 482 at ¶¶ 10-13.

SR Plaintiffs concede that Federal Defendants are only required

to use the best science available, and not the best science possible. *See* Doc. 492 at 17 (citing *S.W. Ctr. for Biological Diversity v. Babbitt*, 215 F.3d 58, 60-61 (D.C. Cir. 2000)). However, SR Plaintiffs assert it "stretches credulity" to accept that the Government was unable to run this model because:

> [its] development began in 1999 with the assistance and participation of Reclamation and FWS (Dotan Decl., ¶ 6), [it] is based upon the HEC-5Q platform that has been around since the 1980s and which is the platform of the USBR's Upper Sacramento River Water Temperature Model used in this consultation (Id., ¶ 8; BA, App. H, p. H-5), [it] was completed for the Stanislaus River only in 2001 (Dotan Decl., ¶ 19), and [it] has been used by Reclamation for its Friant Restoration Project and Delta-Mendota Canal Recirculation Project. (Dotan Decl. ¶ 33).

Id. This argument continues:

> All of this, coupled with the fact that representatives from NMFS, FWS and Reclamation sit on the TAC and Super TAC committees overseeing the development and use of the SJRWTM, and that employees from these agencies have received specific training on how to run the model (Dotan Decl., ¶¶ 36-43), shows that the Government's defense is, at best, one of willful ignorance that should not be tolerated. Moreover, the Government was told repeatedly to use a temperature model with a smaller time-step, and specifically the Stanislaus River portion of the SJRWTM, well before the BO was due, yet the Government failed to do so at every turn.
>
> In April 2008, the CALFED Science Program told the Government that it needed to use the latest technology in temperature modeling by utilizing models with smaller time-steps (NMFS AR at 00038723), but the Government chose not to take this advice in regards to the Stanislaus River. In January 2009, a mere six months before the final BO was due and eight months after the Science Program recommended using models with shorter time-steps, a draft of the BO was reviewed by the CALFED Science Review Panel. The Panel again noted the paucity of relevant temperature data for the Stanislaus River and specifically recommended that the Government incorporate into the BO the "considerable temperature work" that had been done on the Stanislaus River with the Stanislaus River portion of the sub-daily SJRWTM. (NMFS AR at 00219651). Again, the Government did nothing. In fact, only in March 2009 – almost a full year after being told to use a model with shorter timesteps and only three

> months before the final BO was due – did the Government finally have internal discussions with its modeler TetraTech about its ability to conduct water temperature modeling for the Stanislaus River. (Reed Decl., ¶ 15). Any inability to run the SJRWTM has more to do with the Government's delay in responding to the advice of the CALFED review teams than with the Government's lack of knowledge or resources.

Id. at 17-18.

Ms. Reed, an NMFS employee with significant involvement in the development of the BiOp disagrees with Plaintiffs' assessment of the circumstances. She declares that the SJRWTM was not functionally available during the consultation:

> 8. ... NMFS was aware of the development of the SJRWTM and participated in some of the advisory group meetings, but NMFS's attempts to use this model in developing the BiOp were not successful.
>
> 9. NMFS disagrees with Mr. Dotan's assertion that the November 2008 version of the SJRWTM was sufficiently complete to utilize. Mr. Dotan states that the final version of the SJRWTM was submitted to CALFED October 2009, months after the June 4, 2009 completion date of the BiOp. Dotan Decl. ¶ 43. He goes on to state that this version "was almost identical" to the November 19, 2008 pre-release version that he made available to stakeholders including NMFS. Dotan Decl. ¶ 42. However, the flaws in the November 2008 version and supporting documentation made it so that NMFS was unable to run the model.
>
> 10. On December 10, 2008, Mr. Craig Anderson, hydrologist/modeler for NMFS, attended a Super TAC meeting. Dotan Decl. Exhibit C. This was his first introduction to the model and its availability. He subsequently downloaded a version of the SJRWTM and documentation from the ftp site, as directed by Mr. Dotan. Mr. Anderson forwarded this model and associated information to Mustafa Faizullabhoy at Tetra Tech who was under contract with NMFS to conduct temperature and other modeling related to the biological opinion development. NMFS 85074-7. Mr. Faizullabhoy has extensive experience with developing, implementing, and evaluating water quality and flow models for environmental analyses including applications of the BASINS, QUAL2E, EFDC, and CE-QUAL-W2 models amongst others. However, Mr. Faizullabhoy had substantial difficulty running the model based only on the information provided at the ftp site and sought advice from Mr. Dotan and Mr. Don Smith, Mr. Dotan's partner in developing the model. NMFS 85074-77, 86560-1, 87111-3,

92267-8, 93310-18, 93319-20, and 94185.

11. The communication between NMFS, Mr. Faizullabhoy, and the model developers reflects that the material was not self-explanatory, and that it was still in development mode. See e.g. NMFS 93319-20. For example, the Tetra Tech modeler had difficulty running the model because the documentation he received had an old version of a table necessary to run the model, which Mr. Dotan admitted "reflects our early work on the Stanislaus model." NMFS 93320. In any case, the model files made available on the FTP site did not include the source code necessary to fully evaluate model numerical schemes and mechanics and important pre-and post processing algorithms. Essentially, the pre-release modeling package contained compiled source code that limits an outside user's ability to effectively alter the model in any substantial way.

12. Mr. Dotan also asserts that he provided training to NMFS and Reclamation staff so that they should have known how to run the model as a result of this participation. Dotan Decl. ¶¶ 37, 39, 40, 41. NMFS disagrees with this contention. While staff participated in the coordination meetings during the development of the SJRWTM, Mr. Dotan's implication that attendees were all fully trained to run the model is incorrect. For example, in response to a request to run the SJRWTM to evaluate early versions of the RPA Actions, Mr. Dean Marston of the California Department of Fish and Game responded that DFG had no resources to run the model, despite the fact that Mr. Marston attended almost all the meetings. NMFS 77613-5; Dotan Decl. Exhibit C. Based on personal communication with other attendees of these trainings, I understand that these sessions were more like demonstrations of the model's features, rather than a training course intended to prepare the participant to be able to run the model (Pers. comm. Mr. Craig Anderson, now USFWS, and Mr. Russ Yaworsky, Reclamation).

13. In order to apply the SJRWTM to the RPA or to Reclamation"s proposed action, the CalSim II results that govern allocations would have to be disaggregated from a monthly time step for use with the SJRWTM, which operates on a 6-hour time step. The manner in which the disaggregation is done is important, as indicated in Mr. Milligan's declaration. Milligan Decl. ¶9. The November 2008 documentation available for running the SJRWTM stated the following regarding using CalSim II data in the model:

> "2.8 Using Addition Tools
>
> The Dss file viewer, HecDssVue, is provided as a tool within the application for viewing and editing dss file data. It can be accessed through the Tool menu in the main HWMS application window. Downscale CalSim will also be included. This tool is used to modify the

CalSim output files for use in the HEC5Q model."

HWMS-HEC5Q User Interface at 8, Exhibit 1. This is the only reference to how to use CalSim II inputs to the model and it indicates that while a tool to downscale CalSim II information will be included in a future version of the model, it was not included in the version available in November 2008. In the absence of that data, there was no explanation which would have allowed NMFS staff to perform the disaggregation process on their own.

14. Mr. Dotan states that the SJRWTM has already been used in several proceedings, including the Stanislaus River studies, Friant Restoration Project, presentations for the SWRCB [303(d)/305(b)] workshop, and the USBR Delta Mendota Recirculation Project. However, Mr. Dotan does not disclose that the operation of this model was usually performed by Mr. Dotan or his partners who worked with him in the development of the code. Dotan Decl. ¶¶ 21, 25 and 33, SJRGA 2007 at 52, Exhibit 2. Their intimate and proprietary knowledge of the model made use of the model possible in those proceedings.

15. In November 2008, NMFS advertised a contract solicitation to contract for outside modeling expertise. This contract was announced on http://www.gsa.gov/portal/content/103541, a public website for advertising Federal contract opportunities. Mr. Dotan did not submit a bid as a direct contractor or subcontractor. NMFS could only have contracted for Mr. Dotan"s services through this sort of public, competitive solicitation given that this model is based on public domain code and is intended to be nonproprietary. It would have been inappropriate for NMFS to attempt to justify contracting Mr. Dotan's services as a sole-source contractor. In December 2009, the contract was awarded to Tetra Tech Inc. Early efforts by Tetra Tech were focused on modeling the Shasta Reservoir carryover storage RPA actions. Initial, internal discussions regarding Stanislaus River water temperature modeling by Tetra Tech occurred in late March 2009 (see NMFS 77320-1), and an official response from Tetra Tech re: their ability to conduct said water temperature modeling occurred on April 16, 2009. NMFS 86560-1. As discussed above, Tetra Tech staff (primarily Mr. Faizullabhoy) subsequently transmitted five emails to Mr. Anderson (NMFS 87111-3, 88597-602, 93310-18, 00093319-20, and 94185) containing model specific technical questions through the remainder of April 2009 into May 2009, with the final email transmission occurring on May 22, 2009 (NMFS 94185). Where appropriate, Mr. Anderson sought the assistance and technical advice of SJRWTM experienced practitioners, including Mr. Dotan. Despite these efforts neither NMFS nor their contractor was able to conduct runs with the SJRWTM for the BiOp analysis.

> 16. In summary, NMFS disputes that the model was sufficiently available for use in the preparation of our BiOp, without the direct and extensive intervention of the developer, Mr. Dotan or his consulting firm, and he did not choose to make his services available to NMFS through a legal contracting process.

Reed Decl., Doc. 482.

NMFS claims it did not have the expertise and could not get Dotan to respond. This is a factual dispute over whether NMFS could use the model. There is no dispute using the shorter time step was the best science. The Supreme Court has "repeated time and again, an agency has broad discretion to choose how best to marshal its limited resources and personnel to carry out its delegated responsibilities." *Massachusetts v. EPA*, 549 U.S. 497, 527 (2007). Although the record suggest that the resources required to run this model properly would be modest, that the model results would be preferable to those presented in the BiOp, and that NMFS had knowledge of the model for over 8 years, a court does not have the authority to order the agency how to direct and allocate its resources. Congress has chosen to partially immunize such agency "mis-performance." SR Plaintiffs' motion for summary judgment that Federal Defendants acted unlawfully by failing to utilize the SRJWTM is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

4. Exceptions Built into Action III.1.2.

Even if, *arguendo*, Federal Defendants' failure to employ the SJRWTM was unlawful, Federal Defendants alternatively argue that that exceptions built into Action III.1.2 render any dispute over the model

used irrelevant. Action III.1.2 was developed to address the impacts of adverse temperatures on the species. The temperature compliance schedule is purportedly based on the species' biological and physiological needs. Reed Decl., Doc. 482 at ¶¶ 3-4. Because the modeling indicated that these temperatures could not always be achieved, the RPA action has a built-in exception, which can be exercised any time the temperature requirements of Action III.1.2 will be exceeded on a three-day average daily maximum temperature. BiOp at 621. Operational adjustments to address such exceptions will be coordinated through the SOG and WOMT. *Id*. NMFS concluded:

> Because every year is a bit different, we determined that matching temperature requirements to the appropriate life cycle timing and providing for exceptions was an appropriate way to provide necessary protections for listed species while allowing for occasional off-ramps when meeting temperatures was not feasible. That is, an approach using feasibility-based exceptions to biologically-based temperature criteria was deemed more protective.

Reed Decl., Doc. 482 at ¶ 29. Because the exception provision "has no limitations," Federal Defendants argue it is immaterial whether the SJRWTM would have shown more instances of exceeding the RPA Action's seven-day average daily maximum temperatures. Doc. 477-1 at 133.

This argument presents a conflict between the adaptive management scheme and the ESA Regulations' explicit demand that Federal Defendants demonstrate the necessity and feasibility of implementing every RPA Action. Flexibility is the essence of adaptive management, a tool that is indisputably beneficial both to the species and impacted stakeholders. But, Federal Defendants describe an exception

that "has no limitations."[38] How often can the exception be triggered without rendering the Action ineffectual? This is not examined. Without such an analysis, the extent to which this RPA is "essential" to avoiding jeopardy cannot be evaluated. This makes the RPA unlawful and it must be addressed on remand.

5. Does the Record Support the Finding that Action III.1.3 Will Avoid Jeopardy to or Adverse Modification of CV Steelhead or Critical Habitat?

The objective of Action III.1.3 is to operate the East Side Division[39] dams to "optimize CV steelhead habitat for all life history stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on [the] declining limb of pulse." BiOp at 622. Specifically, the Action requires the Bureau to achieve a minimum flow schedule prescribed in Appendix 2-E and generally described in Figure 11-1, copied below:

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[38] Federal Defendants later clarify that Reclamation must support an invocation of the exception with iterative modeling that demonstrates varying allocations and delivery schedules do not let them meet the required temperatures." BiOp at 621. But, this does not place a limit on the number of times the exception may be invoked, nor does it demonstrate the extent to which repeated invocation of the exception will undermine the purpose of the Action.

[39] New Melones Dam operates in conjunction with Tulloch Reservoir and Goodwin Dam on the Stanislaus River to form the East Side Division. *See* BiOp at 197.

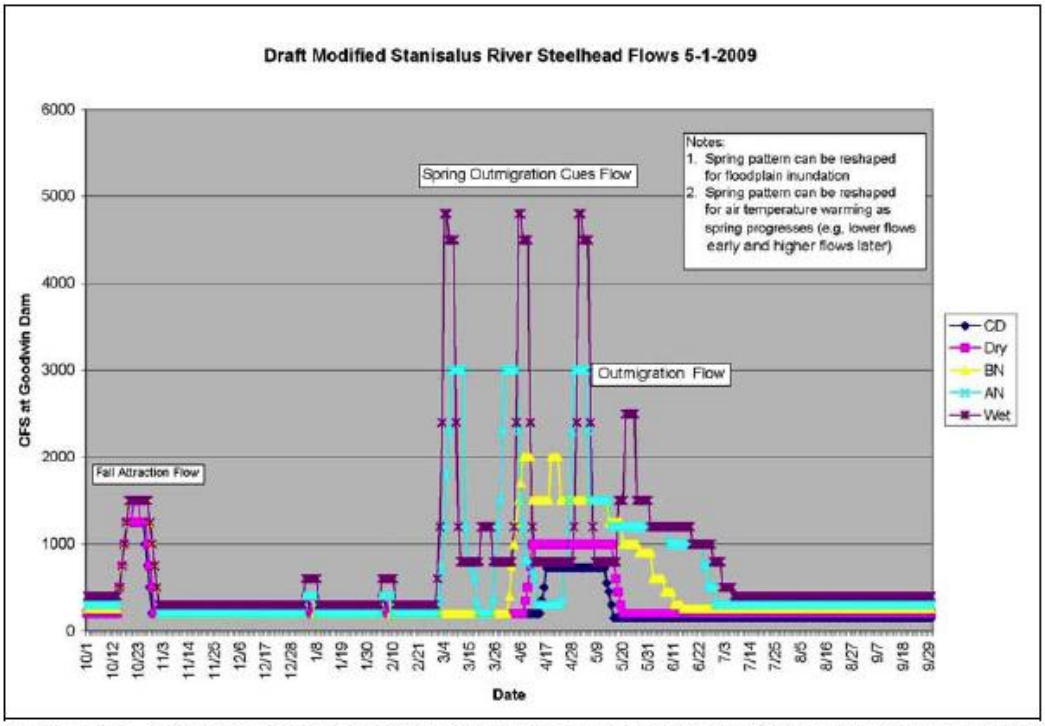

Figure 11-1. Minimum Stanislaus River in-stream flow schedule for CV steelhead as measured at Goodwin Dam

Id. at 623. SR Plaintiffs take issue with the requirement of releases as high as 5,000 cfs in the spring of wet years, which represents a drastic change from the prior flow regime and such high flows are unjustified.

NMFS explains in a May 31, 2009 memo from Rhonda Reed to Maria Rea that the flow requirements of Action III.1.3 are based on a 1993 study by Aceituno, which uses "In-stream Flow Incremental Methodology" ("IFIM"). AR 00105879. NMFS then conferred with CDFG and FWS biologists regarding CV Steelhead's need for pulse flows. AR 00105881-82. These consultations revealed that a fall attraction pulse was needed. This is included in Action III.1.3 and is not challenged by SR Plaintiffs.

NMFS also assessed whether CV steelhead needed a spring pulse

flow:

> Do steelhead need spring pulse flows, or can they just swim out on their own? CV steelhead are captured at the RSTs before the pulse flows, so early smolts may not need a spring pulse. However, the spring pulse does improve downstream water quality conditions for smolts that are leaving later, and this may be more important than for swimming assistance.

AR 00105882. SR Plaintiffs object that this language is equivocal and that a life stage of the species "may" need a particular pulse flow is not sufficient justification for requiring one.

Although this passage from the Reed Memo does admit that "early smolts may not need a spring pulse," AR 00105882, Defendants point to other record evidence supporting the imposition of a spring pulse flow requirement. Spring pulse flows cue more smolts to migrate, protecting the anadromous form. BiOp at 306-307; AR 00105882 (variability in flow triggers important to anadromy), AR 00105883 (flow variability important to anadromy).

SR Plaintiffs do not directly challenge this rationale. Rather, they argue that even if some form of spring pulse is justified, nothing in the BiOp justifies a 5,000 cfs pulse flow. SR Plaintiffs point out that Aceituno's 1993 IFIM study called for flows ranging from between 50-500 cfs. Aceituno's study focused on instream needs, and did not include an assessment of water needed for spring pulse flows to convey steelhead to delta. BiOp at 307 ("IFIM analysis did not include an assessment of the volume of water needed for a spring pulse flow to convey CV steelhead or fall run from the Stanislaus River into the Delta"); AR 00107828 (Aceituno (1993) explicitly

acknowledging that "[t]his study did not directly provide information on flows needed for smolt emigration in the spring").

CDFG's initial draft recommendation for the RPA Action called for a spring pulse flow of 3,500 cfs. AR 00105882. CDFG's highest recommendation was for a pulse of 4,000 cfs. AR 00061652. NMFS raised the pulse to 5,000, reasoning that this would provide "minimum channel forming flows." AR 00105887. In support of providing such "channel forming flows," NMFS cites Kondolf (2001), which provides an analysis of pre- and post-New Melones flood frequency rates at Knights Ferry on the Stanislaus River. Kondolf (2001) concludes: "flows in excess of 5,000 to 8,000 cfs are needed to mobilize the bed and thereby maintain channel form and gravel quality." AR 00122645. Such flows are "important to rejuvenate spawning beds and floodplain rearing habitat and to recruit allochthonous nutrients and large wood into the river." BiOp at 308.

According to Kondolf (2001), channel-forming flows occurred every 1.4-1.8 years prior to the construction of New Melones, but only once every 5 to 20 years since construction of New Melones. *Id.* Kondolf further explains:

> The frequent floods, those with return intervals of one to five years, and the flows that move the most sediment over time in many natural alluvial channels (commonly considered the "channel forming" flows) (Kondolf *et al.* 1999; Leopold *et al.* 1964), are three to four times smaller since the construction of New Melones Dam. For example, the Q1.s (i.e., the flow equaled or exceeded once per 1.5 years), considered the bankfull flow in many rivers, has been reduced from 5,340 cfs to 1,840 cfs. The Q1o and Q20 were reduced by six to eight times after construction of New

Melones Dam.

AR 00122626. Kondolf (2001) then evaluated the post-dam flood frequency, and concluded that the two-year return flow is 3,070 cfs, meaning that such a flow returns every two years. AR 00122714. A 5,000 cfs flow has a return rate of just over three years. *Id.* Kondolf (2001) supports a regime that would provide for high pulse flows to maintain gravel quality. In general, this is what Action III.1.3 attempts to achieve.

However, in light of Kondolf (2001)'s conclusion that "flows in excess of 5,000 to 8,000 cfs are needed to mobilize the bed and thereby maintain channel form and gravel quality," SR Plaintiffs challenge whether RPA Action III.1.3, which calls for peak flows of 3,000 cfs in above normal years and 5,000 in wet years, would maintain channel form and gravel quality. Kondolf (2001) provides the only record support for flows above the 3,000 suggested by CDFG, yet Action III.1.3 does not actually implement the flow regime suggested by Kondolf (2001). The record provides no support for the conclusion that the regime imposed by Action III.1.3 is sufficient to maintain gravel quality. Particularly in light of the potentially high water costs of these pulse flows, the rationale for Action III.1.3 must be lawfully explained and justified on remand.

SR Plaintiffs' motion for summary judgment that the record does not support the imposition of Action III.1.3's 5000 cfs spring pulse flow is GRANTED; Federal Defendants' and Defendant-Intervenors' cross

motions are DENIED.

6. DFG Salmon Population Model

a. Use of the Model to Set Out-Migration Flows.

In calculating the flows CV Steelhead need for outmigration, NMFS relied upon the "SJR salmon model (V.1.0) (output for doubling salmon and calculating the Stanislaus flow contribution....)" AR 00105883. It is undisputed that this is a reference to a CDFG model used to determine flows needed to double salmon in the San Joaquin River. SR Plaintiffs complain that NMFS's use of the model was inappropriate because: (1) steelhead are not salmon; and (2) the "doubling" goal is distinct from the goal of "avoiding jeopardy." Doc. 454 at 29.

The former argument is identical to the surrogate challenges raised by Plaintiffs and rejected above. Salmon are the best available surrogates for CV steelhead, for which the available data is inadequate for modeling purposes.

Nothing in the record explains why it is appropriate to use a model designed to double the existing salmon population to set numeric flow targets to avoid jeopardy to the CV steelhead. The BiOp must explain why each aspect of the RPA is essential to avoid jeopardy or adverse modification. The facial disconnect between the goal of the salmon-doubling model and the goal of ESA section 7 consultation requires explanation on remand.

SR Plaintiffs' motion for summary judgment that the BiOp unlawfully utilized the CDFG salmon doubling model is GRANTED IN PART

AND DENIED IN PART; and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART. That the model used salmon as a surrogate for CV Steelhead was not inappropriate, but the record does not support the use of a model designed to double salmon to set flow targets to avoid jeopardy.

b. NMFS's Reliance on Draft Model Runs from Outdated Version 1.

The record further suggests that NMFS relied on runs from an outdated version of the CDFG Salmon Model. When it produced the data to NMFS, CDFG explained that the results were preliminary and based upon version 1.0, AR 00061644, which was subsequently subject to peer review and further clarification, AR 00103255-58. CDFG specifically warned NMFS that the results would need to be confirmed through the performance of several checks. AR 00061644. The record reveals no evidence that such corrections were made. The need for confirmation must be addressed on remand.

SR Plaintiffs' motion for summary judgment that the BiOp unlawfully and unreasonably relied upon an outdated version of the CDFG salmon model is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

7. SR Plaintiffs' "Impermissible Major Changes" Argument.

SR Plaintiffs originally advanced the argument that the Stanislaus River RPAs were unlawful because they constituted "impermissible major changes" to the New Melones Project. This

argument was based on SR Plaintiffs citation to 50 C.F.R. § 402.14(i)(2) which provides that "[r]easonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes." However, reasonable and prudent measures ("RPMs") are those measures "necessary or appropriate to minimize [the] impact" of incidental take. 50 C.F.R. § 402.02. No RPMs are imposed upon Stanislaus River operations. There is no "impermissible major changes" language associated with the imposition of RPAs. SR Plaintiffs' motion for summary judgment on this ground is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.[40]

8. Challenges to the BiOp's Feasibility Analyses?

SR Plaintiffs argue that it is impossible to determine from the record whether certain of the Stanislaus River RPA Actions are feasible.

a. General Objection that Feasibility Modeling Employed Erroneous Assumptions.

First, SR Plaintiffs argue that the feasibility modeling employed erroneous assumptions, such as assumptions that constrain allocations

[40] SR Plaintiffs' alternatively argue that the RPA definition impliedly incorporates the "impermissible major changes" prohibition contained in the RPM definition. SR Plaintiffs offer no support for this argument, which is contradicted by the general rule that the plain language of a statute governs, absent "some indication of [] regulatory intent that overcomes plain language ... referenced in the published notices that accompanied the rulemaking process." *See Webb v. Smart Document Solutions*, 499 F.3d 1078, 1084 (9th Cir. 2007).

to OID and SSJID below their entitlements. Doc. 492 at 12-13. This objection has been rejected, as the modeling captures the actual operation of these districts with reasonable accuracy.

SR Plaintiffs' motion for summary judgment that the BiOp's feasibility modeling employed erroneous assumptions is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. Objection that Action III.1.2's Exception Proceedure Renders the BiOp's Feasibility Analysis of that Action Arbitrary and Capricious.

Second, SR Plaintiffs argue that the RPA's exception procedures render any feasibility analysis irrational. *Id.* at 13. SR Plaintiffs do not specifically identify which Action, III.1.2, III.1.3 or IV.2.1, they assert is rendered infeasible by its exception procedures; but they must be referring to Action III.1.2, which contains the broad exception procedure discussed above, *see* BiOp at 621. Action III.1.3 contains no exception procedure, BiOp at 622-26, and Action IV.2.1's exception procedure is narrowly limited, BiOp at 644. SR Plaintiffs succeeded on their argument that Action III.1.2's exception procedure is so broad that it has the potential, without further refinement, to render the RPAs ineffectual. Relatedly, an exception procedure without any guarantees as to whether the exception may be successfully invoked when necessary renders any feasibility analysis impossible. Although Federal Defendants' feasibility analysis need not be perfect, it must be rational. Federal Defendants must reconsider their approach to the feasibility analysis in light of

the numerous problems with the exception process identified above.

SR Plaintiffs' motion for summary judgment that the BiOp's feasibility analysis for III.1.2 is arbitrary and capricious is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. Feasibility of Action III.2.2.

SR Plaintiffs also challenge the feasibility of Action III.2.2, which calls for Reclamation to confer with the SOG to develop an operational strategy to meet the purpose of achieving floodplain inundation flows on a one to three year schedule.[41] *See* Doc. 454 at 32. As this RPA defines no action per se, it is impossible to perform a feasibility analysis of it. Federal Defendants cannot escape the requirement of a feasibility analysis simply because they delay the design of this RPA. Before implementation, Federal Defendants must ensure that any action implemented under RPA Action III.2.2 complies with the requirements of law.

SR Plaintiffs' challenge to this feasibility analysis is correct to the extent there is no validly formulated RPA Action.

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[41] Action III.2.2 specifically requires:

> Reclamation shall seek advice from SOG to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. Reclamation shall submit a proposed plan of operations to achieve this flow regime by June 2011. This plan shall include the minimum flow schedule identified in Action III.1.2, or shall provide justification for any proposed modification of the minimum flow schedule. NMFS will review and, if satisfactory, approve the operational strategy. Reclamation will implement strategy starting in 2012.

BiOp at 627.

9. Are Actions III.1.3, III.2.2 Consistent with the Purposes of the Project?

SR Plaintiffs also argue that implementation of Actions III.1.3 and III.2.2 conflict with one of the express project purposes of New Melones, namely flood control, in violation of 50 C.F.R. § 402.02's requirement that an RPA be "consistent with the intended purpose of the action." *See* Doc. 454 at 32. As to Action III.2.2, which calls for a plan to provide flows large enough to "inundate floodplains" in the winter or spring, no action has yet been defined. SR Plaintiffs' challenge to this feasibility analysis is valid to the extent there is not yet a validly formulated RPA Action.

Action III.1.3 imposes certain pulse flows to benefit CV Steelhead, including the 5,000 cfs pulse flows in wet years discussed above. SR Plaintiffs suggest that these pulse flows, designed to be "channel forming," will conflict with New Melones' flood control purpose. Doc. 454 at 32. However, the BiOp specifically explains that Action III.1.3 is to be implemented for ten days or less in order to limit seepage impacts to nearby landowners. BiOp at 624. SR Plaintiffs fail to acknowledge the short duration of the pulse flows, nor do they otherwise explain how flows of this magnitude and limited duration conflict with the flood control purpose of New Melones.

SR Plaintiffs' motion for summary judgment that RPA Action III.1.3 conflicts with the flood control purpose of the New Melones Dam is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

10. Waste and Unreasonable Use of Water (California Constitution Article X, Section 2).

Finally, the SR Plaintiffs argue that implementation of the Stanislaus River RPAs would require water waste and unreasonable use in violation of Article X, Section 2 of the California Constitution. The Bureau must comply with non-conflicting state water law. Reclamation Act of 1902, Pub. L. No. 57-161, 32 Stat. 288, at § 8 (June 17, 1902); *California v. United States*, 438 U.S. 645, 675 (1978).

The California Constitution states that the right to water is limited to reasonable use, and does not extend to waste or unreasonable use:

> **The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water.**

Cal. Const. art. X, § 2.

SR Plaintiffs concede that release of water for fish is a beneficial use of water in California. However, they argue that the spirit of Article X, Section 2 dictate that any releases must be carefully tailored to "just what is needed to avoid jeopardy so that the remaining water can be reserved for other equally important beneficial uses." Doc. 454 at 35. SR Plaintiffs then argue that Actions III.1.2, III.1.3, III.2.2 and IV.2.1 violate Article X, Section 2 "absent record evidence to support a finding that these RPAs use only as much water as is reasonable and necessary to avoid

jeopardy." *Id.* SR Plaintiffs underestimate the complexity of the waste and unreasonable use standard and the process by which they must establish waste and unreasonable use is occurring.

SR Plaintiffs cite no caselaw to support their assertion that the California Constitution's reasonable use doctrine demands that an RPA "be carefully tailored to just what is necessary to avoid jeopardy." To the contrary, the reasonable use doctrine protects a broad range of interests, including fish protection interests that go far beyond prevention of jeopardy. *See, e.g., Nat'l Audubon Soc'y v. Superior Court*, 33 Cal. 3d 419, 443 (1983) (use of water to maintain scenic and recreational values consistent with the reasonable use doctrine).

Nor do Federal Defendants bear any burden to affirmatively demonstrate that the RPA's comply with the California Constitution. The ESA's implementing regulations specifically enumerate in 50 C.F.R. § 402.02 the analyses NMFS and the Bureau must undertake when promulgating an RPA. It is Plaintiffs who bear the burden in a challenge based upon Article X. *State Water Resources Control Board Cases*, 136 Cal. App. 4th 674, 762 (2006) (rejecting allegation that releases of water pursuant to D-1641 constituted waste and unreasonable use because the plaintiffs failed to demonstrate that the releases "necessarily result[] in an unreasonable use of water."). The reasonableness of a use of water is a question of fact that depends on the particular circumstances of each case. *Id.* Any such claim arises under state law, not the APA, and is not limited to the

administrative record. The briefing in this case has not addressed in any analytic respect the unreasonable use issue.

SR Plaintiffs motion for summary judgment that the Stanislaus River RPA Actions violate Article X, Section 2 of the California Constitution is DENIED WITHOUT PREJUDICE; Federal Defendants' and Defendant-Intervenors' cross motions are PREMATURE.

VII. RECLAMATION'S LIABILITY UNDER THE ESA.

All Plaintiffs move for summary judgment that Reclamation violated the ESA by adopting and implementing the BiOp. 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 [] 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.

Reclamation clearly disagreed with NMFS's approach to many important elements of the BiOp's analysis. *See* Doc. 431 at 119 (Plaintiffs' opening brief citing pages in the record containing Reclamation's critiques of the BiOp). This is not alone the litmus test for Reclamation's liability. In the context of ESA consultation, Reclamation is the regulated party and will not necessarily agree with every aspect of NMFS's opinion on the impacts of Reclamation's project on Listed Species. Under *City of Tacaoma*, Plaintiffs must demonstrate that, at the time it adopted the BiOp's RPA, Reclamation was in possession of any "new information" not considered by NMFS that provided Reclamation a basis for questioning the BiOp's expert conclusions. They have not. Absent such a showing, even though the BiOp is flawed in many ways, Reclamation could rely upon it without incurring ESA liability.

All Plaintiffs motions for summary judgment that Reclamation violated the ESA and/or the APA are DENIED; Federal Defendant and Defendant-Intervenors' cross motions are GRANTED.

VIII. CONCLUSION

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 clear error and inconsistent with standard practice in the field of fisheries biology for Federal Defendants to rely upon the raw salvage analyses set forth in Figures 6-65 and 6-66 to reach conclusions about the effect of specific levels of negative OMR flows on the Listed Species. None of the alternative record citations or analyses cited by Defendants, including the PTM Modeling Results, or Figures 6-71, 6-72, or 6-73, provide sufficient alternative bases for NMFS's conclusions regarding the negative OMR flows below which loss of juvenile salmonids "increases sharply."

(2) Federal Defendants' reliance on Figure 6-71 also suffers from the same unjustified use of raw salvage data. Federal Defendants must clarify on remand whether it is possible to scale the CV steelhead data used in Figures 6-72 and 6-73 to population size and, if not, why unscaled analyses are nevertheless useful. Federal Defendants must also further explain and/or refine the statistical methodologies used to develop these figures.

(3) Federal Defendants' did not act unlawfully in failing to

apply either of the two suggested life-cycle models (IOS and/or OBAN) or other mathematical models, such as the Ricker or Beverton-Holt models, to evaluate project impacts on the Listed Species. However, NMFS's chronic and unsatisfactorily explained failure to avoid studying, analyzing, and applying a life cycle model approaches bad faith in light of all experts' opinions it can be done in far less than the five years the agency has been pleading lack of ability and resources, and in view of the undeniable importance of the information to resolve the perennial dispute over population dynamics.

(4) NMFS did not act unlawfully by failing to segregate discretionary from non-discretionary actions in evaluating the environmental baseline. Although such a delineation could better document the relationship between the requirements of the species and the action agency's statutory authority to implement the RPA, NMFS disclaims the capacity to undertake appropriate modeling and related analysis and Plaintiffs have failed to demonstrate that NMFS's claim is unreasonable or false.

(5) Although it is inexplicable that these species are being managed in a piecemeal fashion, without considering all aspects of their life cycles, including impacts to abundance from ocean conditions and ocean harvest, the ESA does not require a quantitative, causative analysis of the relative importance of these non-Project impacts vis-à-vis Project effects.

(6) NMFS did not act unlawfully by employing a 100-year

timeframe for its analysis of extinction risk.

(7) Certain aspects of NMFS's winter-run viability analysis are clearly erroneous as identified above and must be corrected on remand.

(8) In view of the inconsistency, the 2009 Salmonid BiOp must explain on remand how its conclusions are consistent with the Orca Salmon Harvest BiOp.

(9) Although the BiOp contains some (uncontested) support for a connection between Project operations and the presence of exotic species, the BiOp is remanded for further explanation of how this relates to indirect mortality of the Listed Species.

(10) The record does not support the BiOp's conclusions about the connection between Project operations on the one hand and pollution and/or food limitations on the other. This is not the best available science.

(11) NMFS is not required to set a numeric threshold for adverse modification of critical habitat. The record supports the BiOp's conclusion that Project operations will have appreciable negative effects on the Listed Species' critical habitat.

(12) NMFS's use of surrogates was not unlawful.

(13) The record provides some, albeit equivocal, evidence to support the imposition of some form of flow:export ratio as part of Action IV.2.1. In a world of sound science, a questionable judgment that has significant adverse consequences for the water supply would

not drive the formulation of an RPA. However, this is a scientific dispute between the State and water users' scientists on the one side and federal scientists on the other. Administrative law permits the agency to make mistakes, and the ESA requires such disputes be resolved in the species' favor. This is Congress' choice.

(14) However, the BiOp does not clearly explain the rationale for imposing a 4:1 ratio in above normal and wet years. Particularly in light of the potential adverse consequences of imposing such a ratio, this is unlawful. Full explanation on remand is required.

(15) Likewise, although there is marginal record support for the imposition of some form of OMR flow restriction, Action IV.2.3 must be remanded for further explanation of the necessity for the specific flow prescriptions imposed, which are derived primarily from PTM simulations, a method that is undisputedly an imperfect, if not incompetent, predictor of salmon behavior.

(16) Action IV.3 suffers from a similar defect. Although there is record support for some form of action designed to prevent large numbers of fish from being killed or harmed at the export facilities, lawful explanation is required to justify the specific triggers imposed by Action IV.3.

(17) As to Export Plaintiffs' and DWR's argument that the RPA fails to satisfy the four requirements of 50 C.F.R. § 402.02:

(a) Federal Defendants failed to sufficiently explain

whether the RPA can be implemented consistent with the co-equal, non-environmental statutory purposes of the action.

(b) Although the CVPIA does not grant NMFS unlimited power to take whatever Project water it deems essential for the species, under D-1641, lawful RPA's can (and must) be implemented in a manner consistent with the legal authority and jurisdiction of Reclamation and DWR.

(c) The BiOp reasonably concluded that the RPA is economically feasible for the action agency to implement. Only the costs to the action agency are relevant; economic burdens upon third parties cannot be considered under *TVA v. Hill*.

(d) The fourth § 402.02 requirement demands that an RPA avoid jeopardy and/or adverse modification. Consistent with and incorporating the rulings on the merits of the challenges to RPA Actions IV.2.1, IV.2.3 and IV.3, while there is anecdotal evidence for some of the general approaches used in these RPA Actions, the specific prescriptions imposed are not sufficiently justified or explained. NMFS acted arbitrarily and capriciously in concluding that Actions IV.2.1, IV.2.3 and IV.3 are essential to avoid jeopardy and/or adverse modification.

(18) Regarding DWR's related challenges to Action IV.4.2:

(a) Action IV.4.2 is not inconsistent with Action IV.4, and is not unlawful in that respect.

(b) The record lacks affirmative support for findings

that either Action IV.4.2(1) or Action IV.4.2(2) are feasible.

(c) The record fails to explain why the measures imposed by Action IV.4.2 are essential to avoid jeopardy and/or adverse modification.

(B) Stanislaus River Plaintiffs' motion for summary judgment that the BiOp violates the ESA and the APA is 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 unlawful for NMFS to include the New Melones unit in the action under consideration.

(2) NMFS did not act unlawfully by failing to distinguish between baseline effects and effects of the action.

(3) As to SR Plaintiffs' challenges to the adverse modification findings related to New Melones:

(a) The BiOp's use of a "maximization" benchmark in connection with its analysis of spawnable area is without support in the record.

(b) The BiOp's finding that New Melones operations affect gravel recruitment is without support in the record.

(c) The record adequately supports the BiOp's findings regarding New Melones' effects on temperature conditions in spawning habitat and on downstream migration corridors.

(4) As to SR Plaintiffs' challenges to the New Melones RPA

Actions:

(a) The BiOp does not reasonably or sufficiently explain its decision to set a "maximum habitat goal," which underlies its decision to use certain assumptions to model RPA actions.

(b) The Stanislaus River RPA Actions do not improperly require Reclamation to infringe on OID and SSJID's prior rights to Stanislaus River water.

(c) Federal Defendants did not act unlawfully by failing to utilize the San Joaquin River Water Temperature Model.

(d) The limitations of the exceptions built into Action III.1.2 must be defined on remand to explain how often the exception can be triggered without rendering the Action ineffectual.

(e) The record and best available science do not support Action II.1.3's 5,000 cfs spring pulse flow.

(f) In calculating the flows CV Steelhead need for outmigration, NMFS relied on a CDFG model used to determine flows needed to double salmon in the San Joaquin River. While it was not inappropriate for NMFS to use a model employing salmon as a surrogate for CV Steelhead, nothing in the record explains why it is appropriate to use a model designed to double the existing salmon population to set numeric flow targets to avoid jeopardy to the CV steelhead. This is arbitrary and capricious and must be fully explained on remand. In addition, NMFS must address the fact that the BiOp unreasonably relied upon runs from an outdated version of the model.

(g) SR Plaintiffs' argument that the Stanislaus River RPAs were unlawful because they constituted "impermissible major changes" to the New Melones Project is without merit, as this requirement applies to "reasonable and prudent measures," none of which were applied to the Stanislaus River.

(h) As to SR Plaintiffs' challenges to the BiOp's feasibility analyses of the Stanislaus River RPA Actions:

(1) The feasibility modeling did not employ erroneous assumptions.

(2) Action III.1.2's exception procedure is so broad that it renders any feasibility analysis wholly unreliable and arbitrary. It is unlawful as formulated.

(3) The feasibility of Action III.2.2 cannot be evaluated because the RPA has yet to be defined. This is not a valid RPA. Federal Defendants must ensure that any Action defined in the future complies with the requirements of law. SR Plaintiffs' challenge to this feasibility analysis is correct to the extent there is not a validly formulated RPA Action.

(i) SR Plaintiffs' challenge to Action III.2.2 as inconsistent with the flood control purposes of the New Melones Project is valid, as that Action has yet to be defined and is not yet a valid RPA.

(j) SR Plaintiffs' have not demonstrated that the pulse flows called for in Action III.1.3, designed to be of short

duration to limit seepage impacts to nearby landowners, conflict with the flood control purpose of the New Melones Project.

(k) SR Plaintiffs' have failed to meet their burden to demonstrate that the Stanislaus River RPAs violate Article X, Section 2 of the California Constitution.

(C) All Plaintiffs' motions for summary judgment that Reclamation violated the ESA and/or the APA are DENIED; Federal Defendant and Defendant-Intervenors' cross motions are GRANTED.

It is undisputed that the law entitles the winter-run and spring-run Chinook, CV steelhead, Southern DPS of green sturgeon, and Southern Resident killer whales to ESA protection. Plaintiffs have succeeded on some of their challenges to the BiOp's justifications and analyses of Delta and Stanislaus River operations. The BiOp discusses and prescribes RPAs to address many other sources of harm, including adverse temperature conditions and blockages caused by dams on the Sacramento River. The BiOp's jeopardy conclusion is lawful. Project operations negatively impact the Listed Species and adversely modify their critical habitat in various ways that remain incompletely described and quantified.

Some of NMFS's analyses rely upon equivocal or bad science to impose RPA Actions without clearly explaining or otherwise demonstrating why the specific measures imposed are essential to avoid jeopardy and/or adverse modification. Given the potential serious impacts of these measures, the agency must do more to comply with the

law.

The 2009 Salmonid BiOp and its RPA are ARBITRARY, CAPRICIOUS, and UNLAWFUL, and are REMANDED to NMFS 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.

Within five (5) days of service of this decision, Federal Defendants shall provide a proposed date by which they shall file the new BiOp and any RPA.

SO ORDERED
Dated: September 20, 2011

/s/ Oliver W. Wanger
United States District Judge