UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

The Consolidated Delta Smelt Cases	1:09-CV-00407 OWW DLB 1:09-cv-00480-OWW-GSA 1:09-cv-00422-OWW-GSA 1:09-cv-00631-OWW-DLB 1:09-cv-00892-OWW-DLB FINDINGS OF FACT AND CONCLUSIONS OF LAW RE PLAINTIFFS' REQUEST FOR PRELIMINARY INJUNCTION AGAINST IMPLEMENTATION OF RPA COMPONENT 2 (a/k/a Action 3)(Doc. 433)

I. INTRODUCTION

Plaintiffs, San Luis & Delta Mendota Water Authority (the "Authority") and Westlands Water District ("Westlands"), move for a preliminary injunction ("PI") against the implementation of Reasonable and Prudent Alternative ("RPA") Component 2 set forth in the United States Fish and Wildlife Service's ("FWS") December 15, 2008 Biological Opinion, which addresses the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") on the threatened delta smelt (*Hypomesus transpacificus*) ("2008

Smelt BiOp" or "BiOp"). Doc. 433.

Plaintiffs State Water Contractors; Metropolitan Water District of Southern California; Kern County Water Agency and Coalition for a Sustainable; Stewart & Jasper Orchards, et al.; and the Family Farm Alliance join in the motion. Docs. 449, 451 & 453. Plaintiff-Intervenor Department of Water Resources ("DWR"), the operator of the SWP, partially joins. Doc. 452.

Federal Defendants and Defendant Intervenors opposed. Docs. 469, 473. Plaintiffs replied. Docs. 487, 491, 495, 497 & 507. The motion came on for an evidentiary hearing on April 2, 5, 6, and 7, 2010. Docs. 644, 652, 653 & 654. The parties were represented by counsel, as noted in the record.

After consideration of the testimony of the witnesses, the exhibits received in evidence, the written briefs of the parties, oral arguments, and the parties' proposed findings of fact and conclusions of law, the following findings of fact and conclusions of law concerning the motion for interim relief/preliminary injunction are entered.

To the extent any finding of fact may be interpreted as a conclusion of law or any conclusion of law may be interpreted as a finding of fact, it is so intended.

II. BACKGROUND

The 2008 Smelt BiOp, prepared pursuant to Section 7 of the Endangered Species Act ("ESA"), 16 U.S.C. § 1536(a)(2), concluded that "the coordinated operations of the CVP and SWP, as proposed, are likely to jeopardize the continued existence of the delta smelt" and "adversely modify delta smelt critical habitat." BiOp at 276-78. 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 279. The RPA includes various operational components designed to reduce entrainment of smelt during critical times of the year by controlling exports out of and water flows into the Delta. *Id. at* 279-85.

Component 1 (Protection of the Adult Delta Smelt Life Stage) consists of two Actions related to Old and Middle River ("OMR") flows.

- Action 1, which is designed to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cubic feet per second ("cfs") on a 14-day average and no more

negative than -2,500 cfs for a 5-day running average. *Id. at* 281, 329.

- Action 2 of Component 1 is designed to protect adult delta smelt that have migrated upstream and are residing in the Delta prior to spawning. Action 2 is triggered immediately after Action 1 ends or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.

At issue here is Component 2 (Action 3) (Protection of Larval and Juvenile Delta Smelt), which requires OMR flows to remain between -1,250 and -5,000 cfs, beginning when Component 1 is completed, when Delta water temperatures reach 12° Celcius ("C"), or when a spent female smelt is detected in trawls or at salvage facilities. *Id. at* 282, 357-58. Component 2 remains in place until June 30 or when the Clifton Court Forebay water temperature reaches 25° C. *Id. at* 282, 368.

Component 3 (Improve Habitat for Delta Smelt Growth and Rearing) requires sufficient Delta outflow to maintain average mixing point locations of Delta outflow and estuarine water inflow ("X2") from September to

December, depending on water year type, in accordance with a specifically described "adaptive management process" overseen by FWS. *Id. at* 282-83, 369.

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

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

III. SUMMARY OF MOTION

Plaintiffs' request temporary injunctive relief on the following grounds:

1) the district court has already found that the United States Bureau of Reclamation ("Reclamation") failed to comply with the National Environmental Policy Act ("NEPA") in implementing the 2008 Smelt BiOp RPA; and.

2) the 2008 Smelt BiOp violates the ESA and is arbitrary, capricious, and contrary to law because:

a) various aspects of the BiOp's baseline and effects analysis are flawed, undermining the overall jeopardy conclusion, causing overstatement of the effects of the proposed action and imposition of overly-broad and overly-restrictive RPA Components;

b) the severe OMR flow restrictions in RPA Components 1 and 2 are unsupported by the best available science and the data in the 2008 Smelt BiOp; and

c) Component 3 ("The Fall X2 Action") is arbitrary and capricious, because it is without factual or scientific justification and/or is not supported by the best available science, compelling a finding of likelihood of success on the merits.

Plaintiffs further claim that the implementation of RPA Components 1 and 2 will cause them continuing irreparable harm and that the public interest and balance of hardships favor injunctive relief.

RPA Component 1 has ended for the 2009-2010 water year, mooting any request for injunctive relief against its imposition. Component 3 is not set to begin until September, and Plaintiffs do not presently seek

injunctive relief against its operation. Barring unforeseen circumstances, the parties' cross-motions for summary judgment will be heard and decided before September. Components 1 and 3 are not addressed in this decision.[1]

Plaintiffs' injunction request has been modified over time. Originally, Plaintiffs sought an injunction against implementation of RPA Component 2 and enforcement of the incidental take limits in the BiOp. *See* Doc. 435 at 2-4.

- In place of Component 2, Plaintiffs sought to require Federal Defendants and DWR to use a Potential Entrainment Index ("PEI") to estimate cumulative entrainment loss of delta smelt. If the PEI estimate of cumulative loss is less than or equal to 7%, no pumping restrictions should be imposed; if the PEI estimate of cumulative entrainment loss exceeds 7%, FWS shall be responsible for setting OMR flows under the range specified in Component 2 of the BiOp. Doc. 435 at 3.

[1] During the evidentiary hearing, Plaintiffs argued that testimony regarding Component 3 should be heard because it is relevant to their likelihood of success on the merits. But, even if Plaintiffs were likely to succeed on their claim that Component 3 is arbitrary and capricious, such a finding would have no bearing on the propriety of issuing an injunction against the operation of Component 2. The factual and legal arguments concerning Component 3 are voluminous. In light of Plaintiffs' request that this motion be resolved with all deliberate haste, Component 3 is not addressed at this time.

- **Plaintiffs requested that the Incidental Take Statement ("ITS") be recalculated based on a higher Cumulative Salvage Index ("CSI") of 11.36 for adults. Doc. 435 at 4.**
- **In the alternative, if the above remedies are not imposed, DWR requested that that the Court impose the interim remedial operational conditions imposed following summary judgment in *NRDC v. Kempthorne*, 1:05-cv-1207. Doc. 452 at 2.**

Although Plaintiffs never filed a written modification of their request for relief, at the evidentiary hearing Plaintiffs withdrew their request to enjoin enforcement of the ITS and their request to implement the PEI in place of RPA Component 2 of the RPA. 4/2/10 Tr. 90:4-12; 4/7/10 Tr. 243:23-244:8. Instead, Plaintiffs now propose that Component 2 be replaced by a flat -5,600 cfs ceiling on negative OMR flows during the remainder of the implementation period for Component 2. *Id.*; *see* 4/2/10 Tr. 208.

IV. STANDARD OF DECISION

Injunctive relief, whether temporary or permanent, is an "extraordinary remedy, never awarded as of right." *Winter v. Natural Resources Defense Council*, 129 S. Ct. 365, 376 (2008); *Weinberger v. Romero-Barcelo*, 456 U.S.

305, 312 (1982). Four factors must be established by a preponderance of the evidence to qualify for temporary injunctive relief:

1. Likelihood of success on the merits;

2. Likelihood the moving party will suffer irreparable harm absent injunctive relief;

3. The balance of equities tips in the moving parties' favor; and

4. An injunction is in the public interest.

Winter, 129 S. Ct. at 374; *Am. Trucking Ass'n v. City of Los Angeles*, 559 F.3d 1046, 1052 (9th Cir. 2009).

V. FINDINGS OF FACT

A. The Agency Action.

1. The agency action is the coordinated operation of the CVP and SWP, pursuant to an Agreement for the Coordinated Operation of the two projects ("COA").

2. According to the Rivers and Harbors Act of 1937, 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." 50 Stat. 844, 850.

3. The CVP was reauthorized in 1992 through the Central Valley Improvement Act ("CVPIA"), which modified the 1937 Act and added mitigation, protection, and

restoration of fish and wildlife as co-equal project purposes. Pub. L. 102-575 § 3402, 106 Stat. 4600, 4706 (1992). One of the stated purposes of the CVPIA is to address impacts of the CVP on fish and wildlife. § 3406(a). The CVPIA made environmental protection and water deliveries co-purposes.

4. This case presents a critical conflict between these dual legislative purposes, providing water service for agricultural, domestic, and industrial use, versus enhancing environmental protection for fish species whose habitat is maintained in rivers, estuaries, canals, and other waterways that comprise the Sacramento-San Joaquin Delta.

5. It is of manifest significance to the public interest that DWR, a co-operator and the State contractual partner of Reclamation, disagrees with at least some portions of the RPA and seeks injunctive relief against the calendar-based ceiling in RPA Component 2.

B. Facts Relevant to NEPA Claim.

6. It is undisputed that neither FWS nor Reclamation engaged in any NEPA analysis in connection with preparation or implementation of the 2008 Smelt BiOp.

7. It is also undisputed that on November 13, 2009, the Court entered an Order granting San Luis Plaintiffs' motion for summary judgment on their claim that Federal Defendants violated NEPA when they implemented the 2008 Smelt BiOp without conducting the required NEPA analysis. Doc. 399.

8. FWS did not engage in a systematic consideration of impacts to the human environment and/or consideration of alternatives that took into account those impacts, ordinarily performed as part of a NEPA review.

C. Facts Relevant to ESA Challenges.

(1) Status of the Species.

9. The delta smelt was listed as a threatened species under the ESA on March 5, 1993. 58 Fed. Reg. 12,584 (March 5, 1993). Critical habitat was designated for the delta smelt on December 19, 1994. 59 Fed. Reg. 65,256 (Dec. 19, 1994).

10. The threatened delta smelt, one of the most abundant species in the Bay-Delta ecosystem as recently as thirty years ago, is in imminent danger of extinction. Doc. 94, Findings of Fact Re Plaintiffs' Motion for Preliminary Injunction, ## 1-2. The experts agree that there is no current population count for delta smelt. 4/2/10 Tr. 174 (Feyrer); 4/5/10 Tr. 67 (Newman); 4/5/10

Tr. 231 (Hilborn); 4/6/10 Tr. 95 (Deriso). However, the species' relative abundance from year-to-year is monitored using the Fall Midwater Trawl index ("FMWT") prepared by the California Department of Fish and Game ("CDFG"), as well as other abundance indices. 4/2/10 Tr. 174-75. The FMWT shows a continuously and precipitously declining trend in delta smelt abundance in recent years, registering a series of record-breaking lows. 4/2/10 Tr. 176-78. That trend has continued in the last two years, with the FMWT declining from 23 in 2008 to 17 in 2009, the lowest value ever recorded. *Id.* The population growth rate for delta smelt has been "quite negative" for the last ten years. 4/5/10 Tr. 232. The stock-recruitment relationship for delta smelt, which shows the relationship between adults (i.e., the "stock" of the population) to juveniles recruited into the population, is "trending toward the origin," the opposite direction from recovery. 4/2/10 Tr. 187-88. "There's no question that [the present abundance levels of delta smelt] are very low." 4/5/10 Tr. 232 (Hilborn).

11. FWS recently determined that delta smelt warranted uplisting from threatened to endangered, but that the action was currently precluded by higher priority listing actions. 4/7/10 Tr. 163; 75 Fed. Reg.

17,667 (Apr. 7, 2010). The direct mortality of delta smelt by entrainment at the CVP and SWP pumps, as well as the destruction and adverse modification of its habitat caused by water exports, were important factors in this determination. 75 Fed. Reg. at 17,671 ("The operation of State and Federal export facilities constitute a significant and ongoing threat to delta smelt through direct mortality by entrainment"). As a result of the "immediate and high magnitude threats" confronting the species, the delta smelt was assigned a listing priority number of 2.[2] *Id.* at 17,675.

12. Evidence submitted during trial indicates that, as of the dates of the March Spring Kodiak Trawl (March 8-11, 2010) and 20 mm surveys (March 15-18, 2010), delta smelt were collected in the northern and western portions of the Delta, not in the danger zones of the central or south Delta. SWC Exs. 918 & 919. Through March 28, 2010, the SWP had an expanded salvage of 16 delta smelt, and the CVP had an expanded salvage of 28 delta smelt. SWC Ex. 915.

13. Plaintiffs are correct that during the three years that restrictions on spring exports have been in place, the FMWT index has continued to trend downward.

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

4/7/10 Tr. 94:8-14. However, Mr. Grimaldo testified that improved conditions may not immediately translate into improved survival and population growth. 4/7/10 Tr. 120:9-25.

(2) Baseline Issues.

a. Comparison of CalSim and Dayflow Data.

14. CalSim II ("CalSim") is a computer model developed jointly by DWR and Reclamation. The model simulates SWP and CVP operations and is the standard planning tool for evaluating project operations. 4/2/10 Tr. 101:24-102:6. The first version of the CalSim model was available in May 2002. It is continuously updated. 4/2/10 Tr. 102:7-13.

15. CalSim simulates SWP and CVP reservoir operations, project exports and water deliveries, flow through the Delta, and salinity requirements in the Delta, including the location of X2. 4/2/10 Tr. 102:14-20; BiOp at 207.

16. X2 is the location in the Delta where the salinity is two parts per thousand. It is measured as the distance upstream from the Golden Gate. 4/2/10 Tr. 102:21-24.

17. The CalSim model assumes 82 years of hydrology, 4/2/10 Tr. 101:23-102:3, 103:14-18, 161:2-6, provides the

model with data regarding inflow to reservoirs and other information affecting the water supply, 4/2/10 Tr. 103:19-23. The model also assumes a level of development, which reflects water demand resulting from a particular urban population level, agricultural production, and wildlife refuge needs, 4/2/10 Tr. 104:1-7, as well as the existence and effect of environmental regulations and environmental programs, 4/2/10 Tr. 103:14-18. The assumptions used in the CalSim studies were developed by representatives from FWS, the National Oceanic and Atmospheric Administration ("NOAA"), Reclamation, CDFG, and DWR. 4/2/10 Tr. 105:8-12.

18. The CalSim model assists scientists in making planning decisions by allowing comparisons between studies based on differing assumptions. *See* 4/2/10 Tr. 102:25-103:6. According to Aaron Miller, P.E., an expert qualified to offer opinions on the subject of the formulation and application of CalSim, CalSim is not designed, or intended to be used, to compare CalSim study outputs to actual "historic" data or to outputs from different models, including the Dayflow model. 4/2/10 Tr. 95:7-14; DWR Ex. 511 at ¶8.

19. CalSim study 7.0 was developed as the baseline study for the 2008 OCAP Biological Assessment ("2008 OCAP

BA" or "BA"). Study 7.0 represents existing conditions, and assumes a 2005 level of development and a full environmental water account ("EWA"). 4/2/10 Tr. 104:8-20; 123:21-24, 146:3-6; BiOp at 207. Study 7.1 is a near-future conditions study. It assumes a 2005 level of development and a limited EWA. 4/2/10 Tr. 104:8-23; 123:21-25; BiOp at 207-08. Study 8.0 is a future conditions study. It assumes a 2030 level of development and a limited EWA. 4/2/10 Tr. 104:8-25; 123:21-124:2; BiOp at 208.

20. CalSim study 6.0 was designed to look at the differences between the prior CalSim model used in the 2004 OCAP BA and the new model used in the 2008 OCAP BA. 4/2/10 Tr. 104:8-15, 157:11-18.

21. Study 6.1 is similar to 6.0, but did not include the EWA and used an older version of the X2 estimate. 4/2/10 Tr. 104:8-17. Study 6.1 was prepared at the request of Reclamation biologists to assess changes in water project operations during the pelagic organism decline ("POD") era. 4/2/10 Tr. 149:18-24, 150:16-151:17, 158:8-13. Reclamation biologists compared study 6.1 against the 7.0 and 8.0 studies on pages 13-10 though 13-17 of the 2008 OCAP BA. 4/2/10 Tr. 149:12-24; AR 011057-011064.

22. Mr. Miller testified that study 6.1 should not have been used for comparison because it was not comparable to the other studies. 4/2/10 Tr. 156:25-157:8. Study 6.1 used the Kimmerer Monismith equation to estimate X2 and it, as well as study 6.0, did not completely reflect the new enhancements in the CalSim model developed after the 2004 OCAP BA. 4/2/10 Tr. 157:10-18; SLDMWA Ex. 12 at 205-206.

23. The CalSim 9.0 series of studies represents climate change scenarios. Study 9.0 represents a future condition to serve as a basis of comparison of the effects of climate change to sea level rise, without the inclusion of (b)(2) or EWA. Study 9.1 represents a one-foot sea level rise, without the inclusion of (b)(2) and EWA. Studies 9.2 through 9.5 look at predicted changes in precipitation and temperature for the period 2010 to 2030, relative to conditions for the period 1971 to 2000. The 9.0 climate change scenarios were not intended to be directly compared to studies 7.0-8.0. 4/2/10 Tr. 105:1-5; BiOp at 208. Such a comparison is not valid because the studies make different assumptions regarding environmental programs. 4/2/10 Tr. 123:10-16.

24. In the BiOp, CalSim studies were compared to simulations of historic conditions generated using the

Dayflow model. 4/2/10 Tr. 107:4-7, 142:6-9. Dayflow is a model that estimates historic outflow based on historic precipitation, inflow, and exports, and estimates of delta island diversions. Dayflow also provides an estimate for the location of X2. 4/2/10 Tr. 107:8-14.

25. In the BiOp, FWS purports to quantify adult entrainment by comparing OMR flows from CalSim studies to historic OMR flows during 1967-2007. BiOp at 212-13. The BiOp depicts these results in Tables E-5b and E-5c in the BiOp, which are labeled "difference from historic median value to CalSim II model median value" and "difference from historic median salvage to predicted salvage based on ... CalSim II," respectively. *Id.* at 214. Tables E-5b and E-5c purport to quantify, as effects of the action, changes in OMR flows and entrainment using the Dayflow-generated historic data as the baseline and comparing that to CalSim study results. Based on these comparisons of CalSim data and Dayflow-generated historic data, the BiOp concludes, "adult entrainment is likely to be higher than it has been in the past under most operating scenarios, resulting in lower potential production of early life history stages in the spring in some years." BiOp at 213.

26. In another analysis in the BiOp, FWS purports to

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

27. In the BiOp, FWS performed similar comparisons of CalSim data to Dayflow-simulated historic baseline data to quantify the effects of the action on larval and juvenile delta smelt. *See, e.g.,* BiOp at 219 (examining effect of action on larval and juvenile entrainment and stating "[t]he analysis is based on comparison of historical (1967-2007) OMR and X2 to the proposed action's predictions of these variables provided in ... [CalSim] studies 7.0, 7.1, 8.0, and 9.0-9.5").

28. Mr. Miller explained that outputs from a CalSim study should not be compared to outputs from the Dayflow

model because the assumptions used in the two models are significantly different. 4/2/10 Tr. 107:18-23, 136:10-18.

a. The CalSim model assumes a constant level of development. In contrast, the Dayflow model incorporates a continuous change in the level of development because the Dayflow model is using historical information as input. When comparing models to determine the effect of project operations, the best scientific practice is to keep the assumed level of development constant. 4/2/10 Tr. 107:15-108:15.

b. A CalSim study also assumes a constant regulatory environment, whereas Dayflow uses a regulatory environment that has changed over time. This difference renders any comparison between CalSim and Dayflow outputs unreliable. 4/2/10 Tr. 108:16-109:23.

c. CalSim also operates on a monthly time step, whereas Dayflow operates on a daily time step. The two models also operate to different guidelines. The Dayflow model incorporates a conservative operation to avoid violating a regulation. In contrast, the CalSim model operates strictly to that regulation. 4/2/10 Tr. 107:23-108:3, 109:24-110:9. Operating conservatively results in higher modeled outflow. 4/2/10 Tr. 110:10-14.

d. The differences in the model assumptions and in the way the models operate, as described above, cannot be quantified to calibrate the models. CalSim does not model or simulate historical conditions, so it cannot be calibrated to history. 4/2/10 Tr. 121:18-122:6, 161:2-6. Calibration would be "very difficult, nearly impossible, to do without [] developing a model designed to simulate historical conditions." 4/2/10 Tr. 110:15-111:1. The CalSim model cannot currently predict X2 for historic years because it would require a new model. 4/2/10 Tr. 122:7-16.

e. The Dayflow historic time window that FWS reported using in the BiOp was 1967 to 2007. CalSim studies model water years 1992 through 2003. The BiOp's comparison of CalSim-modeled data to Dayflow-modeled data resulted in comparing different sets of water years. Mr. Miller testified that the best scientific practice regarding years of comparison would have been to use consistent time windows. 4/2/10 Tr. 116:18-117:21; 142:13-15.

f. The artificial neural network ("ANN") and the Kimmerer Monismith equation ("KM equation") are two methods of estimating X2. 4/2/10 Tr. 111:2-16. The CalSim studies used ANN to estimate the position of X2,

because ANN can be adapted to address sea level rise. 4/2/10 Tr. 111:19-25. The Dayflow model uses the KM equation to estimate X2. 4/2/10 Tr. 111:2-8; DWR Ex. 510 at Fig. 2; DWR Ex. 511 at ¶15. The KM equation was developed using historical data, making the KM equation invalid for a sea level rise study. 4/2/10 Tr. 111:19-25.

g. At locations less than 75 kilometers ("km") from the Golden Gate, the KM equation results in an X2 estimate greater than (or farther upstream than) the ANN estimate. In contrast, at locations greater than 75 km from the Golden Gate, the KM equation provides an estimate less than the ANN estimate. 4/2/10 Tr. 112:1-113:18, DWR Ex. 510 at Fig. 2.

29. Mr. Miller calculated the magnitude of error introduced into the BiOp by FWS's application of both the KM and the ANN methods of estimating X2. He replicated the 87 km value as the median estimate of X2 from CalSim study 7.0 using the ANN method, and, consistent with the BiOp, calculated the difference between the reported historic median of X2 [79 km] and the study 7.0 median [87 km] to be 10% [(87 km - 79 km)/79]. He then calculated the median X2 for the CalSim 7.0 study using the KM equation (instead of using ANN) to be 84 km

(instead of 87 km). Finally, he identified the percent difference between the reported historic median estimate of X2 using the KM equation [79 km] and the CalSim study 7.0 median estimate of X2 using the KM equation [84 km] to be 6% [(84 km-79 km)/79 km]. 4/2/10 Tr. 114:6-25; DWR Ex. 511 at ¶¶ 14-16; BiOp at 235-36.

30. FWS did not calculate X2 using the KM equation for the CalSim studies, as did Mr. Miller. Instead, it undertook a direct comparison. DWR Ex. 511 at ¶15. The BiOp reported a 10% difference between the reported historic median X2 and the CalSim study 7.0 X2 median. Calculating the percent difference between the historical median X2 and study 7.0 median X2 using the KM equation resulted in only a 6% difference. From this, Mr. Miller concluded that 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim study 7.0 baseline. 4/2/10 Tr. 114:6-25; DWR Ex 511 ¶ 15.

31. Mr. Miller testified that the differences in the KM equation and the ANN method of estimating X2 has an effect on the BiOp's analysis of habitat area, which in

turn effects the BiOp's prediction of smelt abundance (as measured by the Summer Townet Survey Index). 4/2/10 Tr. 113:19-114:5; BiOp at 235-236, 266-269.

32. Mr. Miller explained that correcting for the differences between the use of the KM and ANN methods to estimate X2 does not correct for all the biases inherent in comparing CalSim data to "historic" data. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. 4/2/10 Tr. 115:1-8; DWR Ex. 511 at ¶16.

33. Mr. Miller testified that when using CalSim study 7.0 -- designed as a current conditions baseline -- instead of the "historical" baseline in the BiOp, and comparing study 7.0 to the near-future 7.1 study, X2 moved upstream 0.7 km. The percentage change in X2 from current to near-current conditions was 0.8%. Further, when comparing study 7.0 to study 8.0 (a 2030 level of development scenario), X2 moved upstream only 1.1 km, with a resultant percentage change in X2 of 1.2% from current to future conditions. 4/2/10 Tr. 128:18-129:11; DWR Ex. 511 at ¶20; BiOp at 235, 265. The 0.7 km change and the 1.1 km change, respectively, were vastly different from the approximately 8.7 km and 9.1 km

changes shown in the BiOp (Figure E-19) using historical Dayflow as the baseline. BiOp at 265; DWR Ex. 511 at ¶7.

34. Using the equation identified in Figure E-20 in the BiOp, Mr. Miller calculated the reduction in suitable habitat consistent with the change in the position of X2. A comparison of CalSim study 7.0 with study 7.1 yielded a reduction in habitat area of 128 hectares, and a comparison of study 7.0 with study 8.0 yielded a reduction in habitat area of 289 hectares. 4/2/10 Tr. 129:12-130:5; DWR Ex. 511 at ¶20; BiOp at 266.

35. Plaintiffs assert that, prior to issuance of the BiOp, FWS was put on notice that comparing historical data to CalSim simulated data was an inappropriate and invalid methodology. 4/2/10 Tr. 133:15-134:11, 137:16-138:16, 138:21-139:14; SLDMWA Ex. 351 at 7; SLDMWA Ex. 261 at 5; SWC Ex. 933 at 3.

a. The 2008 OCAP BA did raise some cautionary notes:

> CalSim II is intended to be used in a comparative mode. The results from a "proposed operation" scenario are compared to the results of a "base" scenario, to determine the incremental effects. The model should be used with caution to prescribe seasonal or to guide real-time operations, predict flows or water deliveries for any real-time operations. The results from a single simulation may not necessarily represent the exact operations for a specific month or year, but should reflect long-term trends.

DWR Ex. 518.

b. DWR Deputy Director Jerry Johns, on October 24, 2008, submitted comments to FWS on the draft effects analysis, generally cautioning against the comparison of modeled data with actual data:

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

AR 8671; *see also* AR 8668 (further explaining unreliability problems comparing historic and modeled data).

c. The State Water Contractors also cited a letter that they sent to FWS before the BiOp was completed. However, that letter only critiqued the comparison of simulated data to historical salvage data, and did not dispute with the comparison of CalSim-simulated to Dayflow-simulated historic data. 4/2/10 Tr. 133-34.

d. Mr. Miller acknowledged that, despite his heavy involvement in the modeling analysis underlying the BiOp, he did not present his current criticism of the use of the data to FWS during preparation of the BiOp. 4/2/10 Tr. 115-16.

36. FWS was not on notice of Mr. Miller's critiques regarding comparing simulated Calsim runs to simulated Dayflow runs, and was not put on notice by him that they were improperly using the specialized models. FWS did not have an opportunity to correct its modeling or address Plaintiffs' concerns.

37. The BiOp explains why FWS looked beyond CalSim. When CalSim was used to identify current Project operations, and these results were then compared to the results of a CalSim modeling run purportedly simulating past operations, the results "were nearly identical" despite significant operational changes in current operations as compared to past. BiOp at 204-05. The BiOp explains that "[t]he inaccuracies in CalSim [led FWS] to use actual data to develop an empirical baseline." *Id.* at 206. FWS "also developed historical time series data for hydrologic variables used in this effects analysis based on the Dayflow database ... and OMR data obtained from USGS." *Id.*

38. Mr. Miller asserts that best scientific practice would preclude FWS from comparing CalSim output to historic data generated by Dayflow. However, Mr. Miller acknowledged that in the 2008 OCAP BA, DWR and Reclamation compared CalSim output to historic data,

albeit for a different purpose, namely to show that the timing and magnitude of reservoir and export operations were similar to historic operations. 4/2/10 Tr. 119-20. Mr. Miller acknowledged that other modelers involved in preparing the BA expressed concerns about using only CalSim data, and that the BA itself questioned the use of that data alone, as CalSim simulations did not provide "an especially satisfactory representation of pre-POD water project operations." *Id.* at 150-51. The BA, prepared by DWR and Reclamation, states: "While we have not adopted an alternative statistical approach [to the use of CalSim model runs] in this biological assessment, we believe it would be a useful way to further assess changes in water project operations during the POD era and we recommend that [FWS] consider such an analysis as further refinement to this BA." *Id.* Other reputed scientists in the field agree with FWS and the BA that the CalSim-generated modeling studies did not "generate[] baselines with a high degree of reliability." *Id.* at 160. Neither Mr. Miller nor DWR offered any alternative to Dayflow to FWS to address that serious shortcoming during preparation of the BiOp. *Id.* at 160-61.

39. Mr. Miller acknowledged that, even if the CalSim comparison had been conducted in the manner he

recommends, it would have confirmed FWS's conclusions that Project operations as proposed in the BA move X2 further upstream in the fall, reducing the amount of habitat for delta smelt and modifying the quality of critical habitat by shifting the low salinity zone away from higher-quality habitat and further into the central Delta. *Id.* at 130. Mr. Miller did not suggest that this revision would result in a *de minimis* shift of X2.

40. Mr. Miller presents substantive criticisms of the BiOp's CalSim runs. These specific concerns were not raised before the agency prior to the BiOp's issuance. Moreover, FWS expressed legitimate concerns, shared with other scientists, about the exclusive reliance on CalSim runs. Mr. Miller concedes that even if his recommended approach had been taken, the same fundamental result would have obtained: project operations shift the position of X2 upstream.[3]

41. This highly technical dispute was not raised before the agency, and there were legitimate concerns about comparing Calsim modeling runs to other Calsim runs. This choice of competing methodologies is not sufficiently clear error to justify the court's intervention.

[3] The magnitude of the shift, not its existence, and what should be done about it may be relevant to the need for and justification of RPA Component 3.

b. **Treatment of "Other Stressors."**

42. Plaintiffs raise a generic concern about how the BiOp treated the many other factors that are undeniably contributing to the decline of delta smelt including: (a) presence of aquatic macrophytes (submerged aquatic vegetation such as *Egeria densa* that may overwhelm delta smelt habitat); (b) predation; (c) introduction and propagation of invasive species, including inland silversides and the overbite clam that compete with the delta smelt; (d) presence of contaminants, such as pesticides and wastewater, in the Delta; and (e) presence of large blooms of blue-green algae toxic to the copepods eaten by delta smelt. BiOp at 182-86; 4/7/10 Tr. 148:17-19, 149:20-25.

43. Plaintiffs take particular issue with a statement in the very first paragraph of a section of the BiOp entitled "Effects of the Proposed Action."

> The Status of the Species/Environmental Baseline section of this document described the multitude of factors that affect delta smelt population dynamics including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and microcystis. The extent to which these factors adversely affect delta smelt is related to hydrodynamic conditions in the Delta, which in turn are controlled to a large extent by CVP and SWP operations. Other sources of water diversion (NBA, CCWD, local agricultural diversions, power plants) adversely affect delta smelt largely through entrainment (see following discussion), but when taken together do not control hydrodynamic conditions throughout the

> Delta to any degree that approaches the influence of the Banks and Jones export facilities. So while many of the other stressors that have been identified as adversely affecting delta smelt were not caused by CVP and SWP operations, the likelihood and extent to which they adversely affect delta smelt is highly influenced by how the CVP/SWP are operated in the context of annual and seasonal hydrologic conditions. While research indicates that there is no single primary driver of delta smelt population dynamics, hydrodynamic conditions driven or influenced by CVP/SWP operations in turn influence the dynamics of delta smelt interaction with, these other stressors (Bennett and Moyle 1996).

BiOp at 202 (emphasis added).

44. The BiOp concludes that "the CVP and SWP have played an indirect role in the delta smelt's decline by creating an altered environment in the Delta that has fostered the establishment of nonindigenous species and that exacerbates these and other stressors that are adversely impacting delta smelt." BiOp at 203; 4/7/10 Tr. 152:5-12. Ms. Goude further testified that it is not possible to quantify the level of effects of those other factors. 4/7/10 Tr. 150:1-3.

45. When asked by the Court to identify any information in the record that supports the BiOp's conclusion that project operations exacerbate the effect of other stressors, Dr. Thomas Quinn, an expert appointed under Federal Rule of Evidence 706, concluded that "there does not appear to be evidence in the record demonstrating that project operations exacerbate the

effect/impact of other stressors." Doc. 633, Order Transmitting Responses from 706 Experts, Ex. A, at 20. Ms. Goude testified that she disagreed with this conclusion, but could not identify any evidence from the record to support her assertion. *See* 4/7/10 Tr. 201:22-203:9.

46. Dr. Andre Punt, another court-appointed expert, further explained the BiOp's notion that indirect effects of the Projects may contribute to effects such as high water toxicity, suppression of phytoplankton, increase of overbite clams, and increase in encounters with unscreened agricultural diversions in the Delta are plausible hypotheses, but that "there are no direct data available to test them." Doc. 633 at 21.

47. In contrast to the BiOp's general statements assigning the blame for at least some, unquantified portion of the negative effects cause by these "other stressors" to the projects, elsewhere, the BiOp acknowledges that there is "no single primary driver of delta smelt population dynamics," *id.* at 202, but rather that there are "multiple factors" and that "not all are directly influenced by operations of the CVP/SWP." *Id.* at 328. "Other stressors" are discussed in detail throughout the BiOp. *See, e.g., id.* at 182-88, 198, 201-

2. Specifically, FWS considered the effects of "predation, contaminants, introduced species..., habitat suitability, food supply, aquatic macrophytes, and microcystis." *Id.* at 202, 277. The BiOp expressly recognizes that the long-term decline of the species "was very strongly affected by ecosystem changes caused by non-indigenous species invasions and other factors...." *Id.* at 189.

48. Although the BiOp acknowledges that "not all" of the multiple factors negatively impacting the species "are directly influenced" by Project operations, the general assertion in the BiOp that other stressors are the result of (or at least exacerbated by) Project operations is not supported by the record. This error compounds the agency's failure to address alternative approaches to avoiding jeopardy, including whether other stressors can be mitigated or eliminated, which NEPA requires.

(3) Challenges to Component 2 (Action 3).

49. Component 2 (Protection of Larval and Juvenile Delta Smelt) requires OMR flows to remain between -1,250 and -5,000 cfs beginning when Component 1 is completed, when Delta water temperatures reach 12° Celsius, or when a spent female smelt is detected in trawls or at salvage

facilities. *Id. at* 282, 357-358. Component 2 remains in place until June 30 or when Clifton Court Forebay water temperature reaches 25° Celsius, whichever first occurs. *Id. at* 282, 368.

50. The objective of Component 2 (which corresponds to Action 3 in Attachment B of the BiOp), is to "improve flow conditions in the Central and South Delta so that larval and juvenile delta smelt can successfully rear in the Central Delta and move downstream when appropriate." BiOp 282.

51. The most recent smelt working group recommendation for the week of April 12, 2010 recommends OMR flows no more negative than -5,000 cfs because the "risk to larval delta smelt was low, given that no salvage of larvae has occurred so far this year and the latest survey data suggest that the greatest densities of delta smelt are in the Sacramento River and downstream of the confluence, and, therefore, outside the influence of the pumps."[4]

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[4] Judicial notice is taken of the existence and content of the Smelt Working Group Recommendation, dated April 12, 2010, available at: http://www.fws.gov/sacramento/es/documents/ds_working_group/4-12-10%20notes.pdf.

a. **Use of Raw Salvage to Justify the Quantitative Flow Restrictions.**

52. The BiOp quantitatively analyzed the effects of pumping at the Banks and Jones pumping plants. 4/6/10 Tr. 19:1-3; BiOp at 208-209.

53. The results of that quantitative analysis, which compared OMR flows with gross salvage numbers, are described in Figures B-13 and B-14 of the BiOp. BiOp at 348, 350. These figures were presented as part of a three and-a-half page section of the BiOp entitled "Justification for Flow Prescriptions in Action 1." BiOp at 347-51. It also appears that this analysis was relied upon to set the calendar-based flow prescription in Component 2 (Action 3), as no other basis for the -5,000 cfs ceiling is presented. Because this portion of the BiOp is critical to the present challenge, it is reproduced here in its entirety:

> **Justification for Flow Prescriptions in Action 1**
>
> Understanding the relationship between OMR flows and delta smelt salvage allows a determination of what flows will result in salvage. The OMR-Salvage analysis herein was initiated using the relationship between December to March OMR flow and salvage provided by P. Smith and provided as Figure B-13, below. Visual review of the relationship expressed in Figure B-13 indicates what appears to be a "break" in the dataset at approximately -5,000 OMR; however, the curvilinear fit to the data suggest that the break is not real and that the slope of the curve had already begun to increase by the time that OMR flows reached -5,000 cfs.

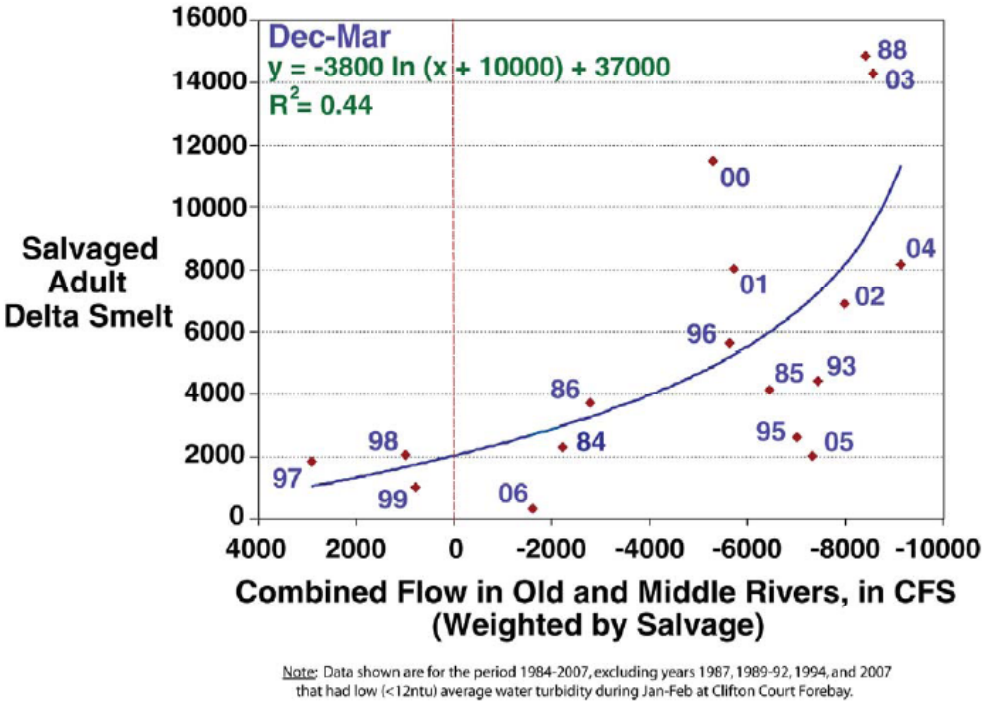

Figure B-13. OMR-Salvage relationship for adult delta smelt. (source, P. Smith). Data from this figure were the raw data used in the piecewise polynomial regression analysis.

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

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

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

increases. The pseudo-R_2 value was 0.42, a value similar to that obtained by P. Smith in the original analysis.

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

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

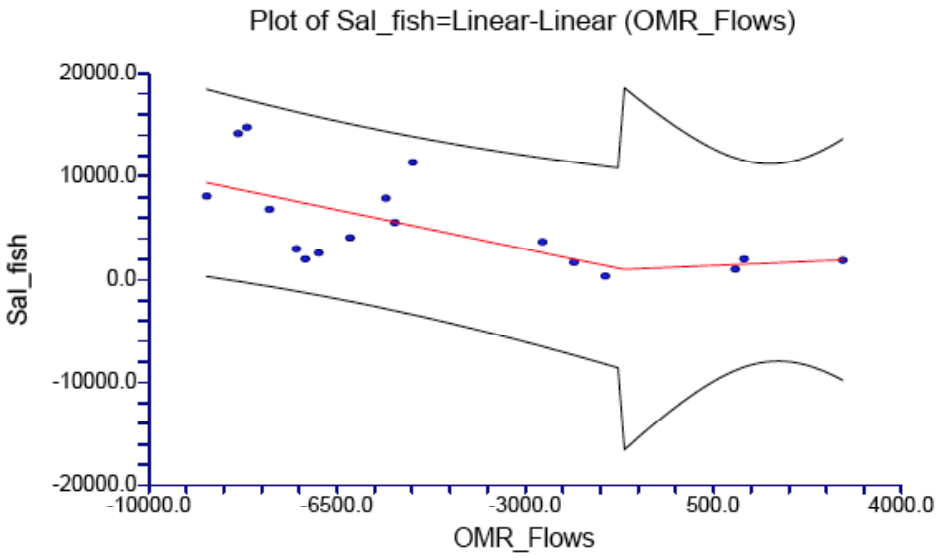

Figure B-14. Piecewise polynomial regression of OMR flows and salvage. The change point is the location at which the two regression lines meet; -1,162 cfs OMR.

> The original values of OMR and salvage could have been measured with error due to a number of causes, consequently the values used in the original piecewise polynomial analysis could be slightly different than the "true" values of salvage and OMR flow. Consequently, a second analysis was undertaken to examine the effect of adding stochastic variation to the OMR and salvage values in the piecewise polynomial regression analysis. The correlation between OMR and salvage in the original dataset was -0.61 indicating that the more negative the OMR, the greater the salvage. Consequently, it was necessary to maintain the original covariance structure of the data when adding the error terms and performing the regressions. The original covariance structure of the OMR–salvage data was maintained by adding a random error term to both parameters. The random error term was added to OMR and a correlated error term was added to salvage. The expected value of the correlated errors was -0.61.
>
> The error terms were selected from a normal distribution with a mean of 1.0 and a standard deviation of 0.25 which provided reasonable variability in the original data. Operationally this process generated a normal distribution of OMR and salvage values in which the mean of the distributions were the original data points. Additional analyses were performed with standard deviations of 0.075, 0.025, and 0.125. Smaller standard deviations in the error term resulted in estimates of the change point nearer to the original estimate of -1,162 cfs. This is to be expected as the narrower the distribution of error terms, the more likely the randomly selected values would be close to the mean of the distribution. The process was repeated one hundred times, each time a new dataset was generated and a new piecewise polynomial regression was performed. The software package @Risk (© Palisade Decision Tools) was used to perform the Monte Carlo simulations. Latin hypercube sampling was used to insure that the distributions of OMR and salvage values were sampled from across their full distributions. The parameter of interest in the simulations was the change point, the value of the OMR flow at which the amount of salvage began to increase. Incorporating uncertainty into the analysis moved the change point to -1,800 cfs OMR, indicating that at flows above -1683, the baseline level of salvage occurred but with flows more negative than -1683, salvage increased.

BiOp 347-51 (emphasis added).

54. The BiOp does not use this information to assert that entrainment has a statistically significant effect on the population of delta smelt every year. 4/7/10 Tr. 172. Rather, this information appears to be used to set

"break points" above and below which entrainment rates noticeably change. In turn, these break points were utilized in the formation of the flow restrictions in the RPAs.

55. It is undisputed that the use of gross salvage does not account for the size (or relative size) of the smelt population, as estimated by reliable abundance indexes. 4/6/10 Tr. 22:10-11, 23:19. The BiOp admits as much, and concedes that the analysis "assumes that as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant." *See* emphasized text above.

56. Considering gross salvage numbers alone provides no means of distinguishing an event in which 10,000 fish are salvaged out of a population of 20,000 from an event in which 10,000 fish are salvaged from a population of 20 million. 4/6/10 Tr. 24:19-22.

57. FWS was aware of the problems with using gross salvage numbers before the completion of the BiOp. The August 26, 2008, draft meeting notes of FWS's Delta Smelt Action Evaluation Team state:

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

MWD Ex. 633 at 5.

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

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

MWD Ex. 608 at 8.

59. However, notwithstanding the recommendation of the Independent Peer Review and its own internal staff's recognition that salvage data should be normalized, FWS persisted in using raw salvage data and did not normalize or index the salvage data to the population size. BiOp at 348, 350. As a result, salvage numbers relied upon to justify the RPAs do not relate to any information regarding population-level effects. 4/6/10 Tr. 22:10-11, 23:19. This was unreasonable, not based on the best available science, arbitrary, and capricious.

60. This conclusion was supported by explanatory testimony of the experts. There was agreement among the testifying scientific experts that the use of normalized salvage data rather than gross salvage data is the standard accepted scientific methodology among

professionals in the fields of fisheries biology/management. 4/5/10 Tr. 97:4-10, 143:25-144:1; 4/6/10 Tr. 30:15-22; Doc. 633, Ex. A, at 7, 10; 4/6/10 Tr. 31:11-16; MWD Ex. 608 at 6; Fed. Gov't Smelt Ex. 17 at ¶11.

a. The Federal Defendants' expert on biological statistics, Dr. Kenneth Newman, stated in his declaration that Federal Defendants should have "scale[ed] salvage by some measure of population abundance" and stated in his oral testimony that without indexing salvage to population there is "nothing to go on." Fed. Gov't Smelt Ex. 17 at ¶11; 4/5/10 Tr. 143:25-144:1.

b. Dr. Newman went on to state that the relevant factor to consider is the percentage of the smelt population being removed by entrainment and that salvage data by itself is not sufficient. 4/5/10 Tr. 97:4-10. Dr. Newman also stated that because Figure B-13 relates raw salvage to combined OMR flows, it does not enable the agency to determine the effect on the population of a particular OMR flow. 4/5/10 Tr. 100:11-15.

c. Dr. Punt found that "it was unreasonable (given that appropriate data and analysis methods were available to account for population size) to have only

relied on the information in Fig. B-13 and Fig. B-14 rather than on an analysis in which salvage is expressed relative to population size." Doc. 633, Ex. A, at 7. Dr. Deriso agreed. 4/6/10 Tr. 30:15-31:2.

d. Dr. Thomas Quinn, the other 706 expert, stated: "it is not clear why such an adjustment [of salvage to population size] was not made for the data examined in this report." Doc. 633, Ex. A, at 10. Dr. Deriso agreed. 4/6/10 Tr. 31:11-19.

61. The BiOp itself recognized the necessity of normalizing raw salvage data:

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

BiOp at 338.

62. August 26, 2008 meeting notes of the Delta Smelt Action Evaluation Team also indicate that FWS recognized and was aware of the need to analyze the percentage of the population removed by salvage, but neither these notes nor the BiOp explain why this analysis was not performed. MWD Ex. 633 at 5; 4/5/10 Tr. 96-97:14-10.

63. The BiOp, in fact, used normalized salvage data for other parts of its analysis, including the Incidental

Take Statement, evidencing its ability to do so. BiOp at 386; 4/7/10 Tr. 196:18-20; *see also* 4/7/10 Tr. 199:14-21 (Cay Goude testifying that FWS understood the importance of using normalized salvage data and chose to use it in parts of the BiOp).

64. FWS did not explain its decision in the BiOp to use gross salvage numbers in Figures B-13 and B-14, and did not explain why it selectively used normalized salvage data in some parts of the BiOp but not in others. 4/6/10 Tr. 28:5-8, 32:5-9.

65. FWS presented no credible, scientifically based explanation for the decision to use gross salvage numbers instead of normalized salvage data in Figures B-13 and B-14, either in the BiOp or at the hearing. Other than endeavoring to structure a result, there is no explanation for this departure from best available science. This raises the spectre of bad faith.

66. For the purposes of (a) demonstrating the difference between the analysis presented in the BiOp and a population-normalized analysis and (b) identifying an appropriate interim remedy, Dr. Deriso analyzed the relationship between normalized salvage and OMR flows. This analysis revealed that there were no detectable trends in the juvenile salvage rate at flows up to -5,600

cfs, which is the most negative salvage weighted flow rate contained in the data. 4/6/10 Tr. 55:18-24; Fed. Gov't Smelt Ex. 18 at ¶25.

67. Federal Defendants criticize Dr. Deriso's alternative analysis in a number of ways:

a. Dr. Newman explained that Dr. Deriso's analysis is more appropriately characterized as a "first cut" at an analysis that fails to correct for potentially large "observation errors." 4/5/10 Tr. 73, 77-78. Those "errors" include factors and variability that would tend to confound the results if not accounted for, such as temperature variations, geographic distribution, turbidity, or predation, all of which can "distort[,] confuse or confound" the relationship between the factors one is trying to examine. *Id.* at 51 (Dr. Newman's testimony regarding the factors he will be addressing and including in his forthcoming delta smelt life cycle model). He opined that some of these confounding factors are very important and ignoring them could lead one "[e]ither to wrongly assume that there is a relationship or to assume that there is [one] when there isn't." *Id.* at 82. This concern was reiterated by Dr. Rose in his 2000 paper, and by Dr. Hilborn. *Id.* at 160-61.

b. Dr. Newman ran his own analysis, applying a

different standard statistical methodology, on the same cumulative salvage index versus OMR flow data used by Dr. Deriso, and got different results regarding the "inflection point" where OMR flows had an increasing impact on the population-normalized salvage rate. 4/5/10 Tr. 63-64. Ultimately, Dr. Newman testified that he would have performed a statistical analysis different from those performed by both Dr. Deriso and in the BiOp. *Id.* at 79-80. Dr. Newman never suggested that an analysis utilizing raw salvage numbers (i.e., not adjusted for relative population size) is scientifically appropriate. This is not just a scientific dispute among experts, particularly in view of FWS's concession in the BiOp.

c. Dr. Deriso admitted that he is not a delta smelt biologist, 4/6/10 Tr. 125, and that his analysis does not account for a number of potentially confounding factors, such as: the large amount of pumping-related mortality that is not measured by salvage, *id.* at 89; 116, pumping-related changes to delta smelt habitat, *id.* at 116, 140; pumping-related impacts on food supply, *id.* at 143; pumping-related impacts of spatial confinement of delta smelt to the Sacramento River, *id.* at 144-45; whether the death of some individuals such as fecund

females may have a disproportionate impact on the population (the so-called "big mama" hypothesis) *id.* at 116; and whether the relationship between OMR flows and population abundance could change depending on population size, *id.* at 146.

d. Nor did Dr. Deriso's analysis distinguish between years pre-dating or post-dating the POD, though he acknowledged that there is evidence of drastic changes in the estuary during that period. *Id.* at 123-24, 165. Reputable scientists in the field, including Drs. Peter Moyle and Bill Bennett, have opined that statistical "correlations [in the Delta] seem to be losing some of their former predictive value in recent years for some desirable species (Kimmerer et al. 2009). This, in part, may be due to ... the extremely low abundance of desirable fishes, which may not be tracked as effectively by the traditional monitoring programs." *Id.* at 119-20.

e. In the absence of reliable population estimates for delta smelt, Dr. Deriso utilized the FMWT index as a proxy for population when conducting his analysis of the population-level effects of salvage on adult delta smelt. However, Dr. Newman noted that there are several biases in the FMWT data, particularly selection bias, such that he would not rely purely on

FMWT data "when it comes to analyzing salvage." 4/5/10 Tr. 118.

e. In addition, Dr. Deriso's analysis accounts in only a very limited way for spatial distribution (by excluding years with low turbidity from the analysis). Spatial distribution reflects the increased vulnerability of delta smelt to entrainment as they move closer to the pumps. 4/5/10 Tr. 80-82. In contrast, Components 1 and 2 of the BiOp account for spatial distribution to a much greater extent by allowing for modification of the level of OMR flows based on the location of delta smelt in the estuary. 4/7/10 Tr. 55-56, 69-71. Dr. Deriso's analysis looks solely at the relationship between population-weighted salvage and OMR flows, excluding all other factors and considerations.

68. Nevertheless, even assuming all of these critiques of Dr. Deriso's opinion are valid, they do nothing to justify the BiOp's election to base its flow prescriptions on an analysis that uses raw salvage numbers. Even if Dr. Deriso's "first cut" needs refinement to address these critiques, the BiOp's analysis in Figure B-13 does not account for any of the issues on which Federal Defendants criticize Dr. Deriso's analysis.

69. Federal Defendants note that Dr. Deriso presented his conclusions and analysis regarding the BiOp to the National Research Council of the National Academy of Sciences panel that peer-reviewed the BiOp. 4/2/10 Tr. 193; 4/6/10 Tr. 137. After reviewing the information presented by Dr. Deriso, that panel explicitly disagreed with his conclusion that FWS's analysis in the BiOp was not based on the best available science or one that a "reasonable biologist" would perform. Instead, the NRC Panel confirmed the analysis performed by FWS and its biologists, stating that:

> Although there are scientifically based arguments that raise legitimate questions about this action, the committee concludes that until better monitoring data and comprehensive life cycle models are available, it is scientifically reasonable to conclude that high negative OMR flows in winter probably adversely affect smelt populations. Thus the concept of reducing OMR and negative flows to reduce mortality of smelt at the SWP and CVP facilities is scientifically justified.

4/2/10 Tr. 194. The NRC analysis justifies its conclusion by recognizing better monitoring is not available, a comprehensive life cycle model does not exist, and that high negative OMR flows in winter "probably" adversely affect smelt populations.

70. The NRC's equivocal conclusion is in no way inconsistent with a finding that the BiOp failed to utilize the best available scientific methods by relying

on a quantitative analysis using raw salvage to select the upper ceiling for negative OMR flows under Component 2. The Federal Defendants have not told the whole NRC Panel story. The NRC Panel expressly found that "there is substantial uncertainty regarding the amount of flow that should trigger a reduction in exports," (emphasis added) and declined to decide whether alternative RPAs would "provide equal or greater protections for the species while requiring less disruptions of Delta water diversions," concluding that the panel had received insufficient documentation on such alternatives. *Id.* at 200-01. Having failed to perform the required NEPA analysis, it is certain that Federal Defendants could not and did not take the requisite hard look at RPA alternatives.

71. Federal Defendants argue that the district court previously heard and rejected similar statistical analysis of fish population dynamics presented by Mr. B.J. Miller during the 2007 interim remedy hearing.

a. Mr. Miller "concluded that there was no statistical significance in the relationship between Delta smelt abundance and salvage and export operations in the pumps." 4/6/10 Tr. 114. Another of Plaintiffs' witnesses in that proceeding, Dr. Charles Hanson, then

explained that even if Mr. Miller's statistical analyses were correct and "reflect the low significance of that salvage mortality to the population," it did not suggest that regulatory action to minimize salvage at the pumps was not justified:

> On the other side, Your Honor, the fact that we are salvaging Delta smelt represents a source of mortality to this population. And one of the approaches that's being made, given the low population abundance, is to identify those sources of mortality that we know of and to try and reduce those. My feeling is that we have such a complex estuary with so many interacting variables that change from year to year and within years, that it's difficult to rely solely on statistical analyses. I think we're at a point where we need to say do we have a substantial source of mortality and is there something we can do to help reduce that.

4/6/10 Tr. 114-15.

b. Plaintiffs' expert, Dr. Hilborn, expressed similar opinions during the most recent evidentiary hearings, acknowledging that, while he criticized the BiOp for lacking "a basis for population level effects of the proposed actions... it's pretty clear that there are viability concerns about Delta smelt." 4/5/10 Tr. 224. Dr. Hilborn also acknowledged "it's very clear that large negative flows have an impact on the number of fish that are impinged and entrained." *Id.* at 228. He did not quantify what he meant by "large negative flows." Dr. Hilborn agrees that there is no doubt that the population size of delta smelt is currently at an historic low and

that entrainment at project facilities results in direct mortality. *Id.* at 249-50. Dr. Hilborn explained that he does not deny that a long-term relationship between population growth rate and salvage may exist, only that he has not *seen* "any evidence of that in any of the analysis I've seen so far." *Id.* at 228. Dr. Hilborn acknowledged that he "couldn't exclude the possibility" that a future salvage event could eliminate 100% of the population, even if there was no relationship between the amount of delta smelt salvaged and long-term population dynamics. *Id.* at 229.

c. Assuming, arguendo, the "possibility" cannot be "exclude[d]" that a future salvage event could eliminate 100% of the population, FWS did not justify its selection of -5,000 cfs on the basis of that ceiling's ability to prevent such a catastrophic salvage event. Faced with express concerns from inside and outside the agency about drawing conclusions from analyses using raw salvage, FWS completely failed to explain why it nonetheless did so. None of the post-hoc rationalizations offered by Federal Defendants, e.g. the "big mama" hypothesis, was mentioned in the BiOp as bases for selecting -5,000 cfs as the ceiling for negative OMR flows.

72. FWS's reliance on analyses that utilize raw (as opposed to population-normalized) salvage data is an undeniable failure to use the best available scientific methodology.

b. Other Data Supporting the General Conclusion that Negative OMR flows Jeopardize the Smelt.

73. There is far more dispute over the sufficiency of evidence supporting the BiOp's general conclusion that the negative OMR flows predicted to take place under planned Project operations will jeopardize the smelt (referred to in this subsection as the "jeopardy conclusion").

(1) Sporadically Significant Take.

74. One of the key rationales for the jeopardy conclusion is the assertion that entrainment has a "sporadically significant" effect on smelt abundance. BiOp at 210. This assertion was based on the estimates of proportional entrainment in Kimmerer 2008. BiOp at 210; Fed. Gov't Smelt Ex. 38. Kimmerer 2008 states that:

> Delta smelt may suffer substantial losses to export pumping both as pre-spawning adults and as larvae and early juveniles. In contrast to the situation for salmon, pre-salvage mortality has been constrained in the calculations for adult Delta smelt, and its effects eliminated from the calculations for larval/juvenile Delta smelt. Combining the results for both life stages, losses may be on the order of zero to 40 percent of the population throughout winter and

spring.

4/7/10 Tr. 42-43; AR 018877.

75. Dr. Grimaldo confirmed that the Kimmerer (2008) and Kimmerer and Nobriga (2008) studies represented the "best available science" when the BiOp was prepared. 4/7/10 Tr. 63-64. The BiOp cites Kimmerer (2008) (and other peer-reviewed studies) for the propositions that entrainment can affect the abundance of delta smelt in certain years; may prevent recovery when habitat conditions are suitable; and that high entrainment of adults in the winter appears to have played a role in the decline of delta smelt in the POD years. BiOp at 158-59.

76. Dr. Deriso questions whether Kimmerer (2008) should be interpreted as standing for the proposition that entrainment mortality can kill a substantial portion of the population in some years. For example, he testified that the Kimmerer (2008) article relied on a number of assumptions to calculate the percentage entrainment figures incorporated into the BiOp, including the assumption that a proportional relationship exists between OMR flow levels and entrainment. 4/6/10 Tr. 131:12-16; Fed. Gov't Smelt Ex. 29 at ¶19; Fed. Gov't Smelt Ex. 38 at 018875-018876. Because the Kimmerer (2008) article began with this assumption, Dr. Deriso

opined that it could not reasonably be used by FWS as evidence that a proportional relationship exists between OMR flow level and smelt entrainment. Fed. Gov't Smelt Ex. 29 at ¶19.

77. But, the BiOp did not rely on Kimmerer (2008) for this purpose. Dr. Grimaldo explained that "what the Kimmerer 2008 paper actually showed was that there was a population response [to entrainment] within life stages." 4/7/10 Tr. 98.[5] Dr. Newman explained that this information is "certainly pertinent to understanding what's happening with the population." 4/5/10 Tr. 135-136.

78. Dr. Newman, who did not participate in the preparation of the BiOp, agreed that FWS's conclusion in the BiOp that entrainment affects subsequent year

[5] Kimmerer (2008) acknowledges that "...despite substantial variability in export flow in years since 1982, no effect of export flow on subsequent midwater trawl abundance is evident," but refuses to "dismiss the rather large proportional losses of delta smelt that occur in some years; rather, it suggests that these losses have effects that are episodic and therefore their effects should be calculated rather than inferred from correlation analyses." Fed. Gov't Smelt 38 at 25 (AR 018878). Dr. Quinn opined that "evidence should have been presented in the BiOp to demonstrate such effects, based on some calculation." Doc. 633 at 2. For example, he asks: "In which years were there large losses that can be directly attributed to the pumping operations, and what were the effects on subsequent recruitment? Because the smelt are largely annual fish, a catastrophe in a single year could put them at great risk of extinction and two bad years in a row could accomplish it. The risk inherent in the statistical and ecological uncertainty is borne heavily by the species but there still should be some evidence in the record to reveal these effects." *Id.* It is not clear whether the BiOp relies on Kimmerer 2008 as evidence of these effects or simply as evidence that these effects may be significant.

abundance of Delta smelt even sporadically is supported by generally accepted scientific standards. 4/5/10 Tr. 89-90. It is undisputed that very large salvage events can and have occurred at OMR flows of less than -5,000 cfs. In May and June of 1999 alone, 58,929 and 73,368 delta smelt, respectively, were salvaged at the Project export facilities. 4/6/10 Tr. 111. Average OMR flows during those months were -1,062 cfs and -3,814 cfs, respectively. *Id.* at 112. While Dr. Deriso testified that the significance of such an event depends on the size of the population, he also could not state whether the current population was large enough to survive similar salvage events, or whether such an event would jeopardize the continued existence of the smelt. *Id.* Dr. Hanson, another of Plaintiffs' expert fish biologist witnesses, testified in 2007 that salvage of 1,300-1,400 delta smelt would be "a very high level of salvage" "under the current population levels." *Id.* at 113. Delta smelt abundance levels have further declined since Dr. Hanson made that statement. *Id.*

79. It was not unreasonable for FWS to conclude that salvage events may be "sporadically significant."

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(2) Dr. Bennett's Work.

(a) Impact of VAMP on Population Dynamics.

80. Dr. Bennett's unpublished research "demonstrated that the number of larvae that survived to the fall is related to when they hatch in the spring.... [and] that larvae that hatched during the VAMP ... protective period[] were the ones that survived to the fall in the period that he examined." 4/7/10 Tr. 93.

81. The BiOp concluded:

> Based on Bennett's unpublished analysis, reduced spring exports resulting from VAMP have selectively enhanced the survival of delta smelt larvae spawned in the Central Delta that emerge during VAMP by reducing their entrainment. Initial otolith studies by Bennett's lab suggest that these spring-spawned fish dominate subsequent recruitment to adult life stages. By contrast, delta smelt spawned prior to and after the VAMP have been poorly-represented in the adult stock in recent years. The data suggests that the differential fate of early, middle and late cohorts affects sizes of delta smelt in fall because the later cohorts have a shorter growing season. These findings suggest that direct entrainment of larvae and juvenile delta smelt during the spring are relevant to population dynamics.

BiOp at 170 (emphasis added). Nothing in the record suggests this conclusion was unreasonable.

(b) Big Mama Hypothesis.

82. Federal Defendants and Defendant Intervenors also suggest that Dr. Bennett's work provided "evidence"

to support the "big mama" hypothesis that Project operations may affect delta smelt abundance by entraining the most fecund individuals in the population, thereby creating a disproportionate impact on the reproductive potential and growth rate of the population.

83. However, the BiOp does not suggest Bennett's work provides evidence of this hypothesis; rather, the BiOp consistently indicates that the "big mama" hypothesis is just that -- a hypothesis:

> Another possible contributing driver of reduced delta smelt survival, health, fecundity, and resilience that occurs during winter is the "Big Mama Hypothesis" (Bill Bennett, UC Davis, pers. comm. and various oral presentations). As a result of his synthesis of a variety of studies, Bennett proposed that the largest delta smelt (whether the fastest growing age-1 fish or fish that manage to spawn at age-2) could have a large influence on population trends. Delta smelt larvae spawned in the South Delta have high risk of entrainment under most hydrologic conditions (Kimmerer 2008), but water temperatures often warm earlier in the South Delta than the Sacramento River (Nobriga and Herbold 2008). Thus, delta smelt spawning often starts and ends earlier in the Central and South Delta than elsewhere. This differential warming may contribute to the "Big Mama Hypothesis" by causing the earliest ripening females to spawn disproportionately in the South Delta, putting their offspring at high risk of entrainment. Although water diversion strategies have been changed to better protect the 'average' larva, the resilience historically provided by variable spawn timing may be reduced by water diversions and other factors that covary with Delta inflows and outflows.

BiOp at 158 (emphasis added). This hypothesis has not

been proved.

(3) Consideration of Life Stage and Geographic Distribution.

84. The BiOp considers the life stage of delta smelt and where the population is located in the estuary, to help assess entrainment risk. Dr. Grimaldo explained:

> [I]n the fall [and] winter, we have very low entrainment risk. But once the first flush events happen, beginning sometime in mid December, Delta smelt often migrate upstream. So they're vulnerable at this part of the life stage. After they migrate upstream, they stage for a little bit. And they're vulnerable to entrainment during the staging period. And then after the staging period, they spawn. And their progeny are vulnerable to entrainment at this period.
>
> So there's vulnerability to different life stages as -- and, in general, as they become distributed closer to the central and south Delta central and south Delta, their entrainment risk goes up.

4/7/10 Tr. 50-51. The RPA takes into account these spatial and life stage factors by breaking actions into different components over different periods of time. *Id.* at 64-65.

85. Mr. Feyrer and Dr. Grimaldo testified that the export pumps affect the geographic distribution of delta smelt, and that preventing the fish from coming near the pumps reduces the risk of entraining those fish. 4/2/10 Tr. 180; 4/7/10 Tr. 64. Larval and juvenile delta smelt, in particular, are "neutrally buoyant" and thus follow the flow in the Delta in a manner similar to particles.

4/7/10 Tr. 54-55. Particle-tracking modeling shows that many of the particles are "lost" to the pumps when export-inflow ratios are increased. *Id.* at 59-60. Kimmerer and Nobriga (2008), relied on in the BiOp, asserts that these studies "suggest a direct link between the position of the smelt population as determined by outflow and losses as determined by export flow" and "may be enough to recommend strong protective measures for Delta smelt in spring (March-May) of low outflow years when they are highly vulnerable to export losses." *Id.* at 60-62. Non-export factors influence entrainment too, "such as river inflows, the position of X2 and where the fish are distributed." *Id.* However, as Mr. Feyrer testified, "essentially the closer [the fish] are, the more vulnerable [they] will be" to the effects of entrainment.[6] *Id.*

[6] Entrainment includes more than just salvage measured at the pumps. As Mr. Feyrer explained, salvage is a small subset of entrainment: "Salvage is essentially the fish that are observed at the ... salvage facilities. Those are the facilities that are located at both the state and federal export operation facilities. And those facilities are designed to essentially filter the fish out of the water before they are entrained into the pumps. And then they're released back into the estuary. And so those are the fish that you actually observe in salvage. However, entrainment refers to the fish that are not observed plus those fish that are observed." 4/2/10 Tr. 180-81. Fish that are not observed include those that suffer from pre-screen mortality at Clifton Court Forebay, *id.* at 182, and those that are not detected due to louver inefficiency. Pumping pulls fish into the Forebay, increasing their exposure to these sources of mortality. *Id.* at 183.

c. **Life Cycle Analysis.**

86. Studies cited in the BiOp failed to demonstrate that water exports affect the delta smelt population growth rate. Kimmerer (2008), for example, noted a "lack of evidence for population-level effects" of the water projects and stated that "no effect of export flow on subsequent midwater trawl is evident." AR 018878, 018855; MWD Ex. 600 at 53; MWD Ex. 600 at 28. Bennett (2005) found that "it is unlikely that losses of young fish to the export facilities consistently reflect a direct impact on recruitment success later in the year." AR 017004; MWD Ex. 607; SLDMWA Ex. 240.

87. All experts agree that application of a life-cycle model[7] is accepted method for evaluating the effects of an action upon a population's growth rate.

a. The Delta Smelt Action Evaluation Team recognized that such a model should be developed and utilized. MWD Ex. 633 at 5, 9, 10, 11.

b. Dr. Deriso testified that a population growth rate analysis is the method by which fisheries biologists normally evaluate the impact of a stressor on a population. 4/6/10 Tr. 38:11-18.

c. Dr. Hilborn similarly testified that life-

[7] The experts use the term "population dynamics model," "life history model," and "life cycle model" interchangeably. *See, e.g.*, 4/2 Tr. 255; 4/6 Tr. 41.

cycle models are the accepted method in population dynamics to evaluate anthropogenic effects on the probability of growth or decline of a species. 4/5/10 Tr. 154:16-24. Dr. Hilborn testified that development of such a model is "standard operating procedure" for fisheries management agencies to evaluate human impacts on fish species. 4/5/10 Tr. 155:20-25.

d. FWS's expert, Dr. Newman, stated in his declaration that he "agreed with the utility of life history models for assessing population level effects of SWP/CVP operations." Fed. Gov't Smelt Ex. 17 at ¶8.

e. Dr. Newman said he would have developed a life-cycle model for the BiOp. 4/5/10 Tr. 107:21-108:5. Dr. Newman stated the methodology employed in the BiOp was "quite a different way of doing things" from the statistical analysis he was "familiar with" and "comfortable with." 4/5/10 Tr. 107:21-108:5.

f. Federal Defendants' expert, Mr. Feyrer, testified that, once developed, a life-cycle model would be the best available science to evaluate the population-level impacts of the water projects on the delta smelt. 4/2/10 Tr. 253:4-10.

g. According to Mr. Feyrer, use of a life-cycle modeling methodology in the BiOp would have reduced the

uncertainty in the RPAs. 4/2/10 Tr. 258:22-259:8.

88. How long it would have taken FWS to develop an appropriate life cycle model is a matter of considerable debate.

a. Life-cycle modeling is an analytical technique that has been known and available to scientists for years. 4/5/10 Tr. 109:19-110:3. Numerous textbooks and reference articles explain how to develop a life-cycle model, which are a standard tool used by fisheries scientists to evaluate population-level impacts. 4/2/10 Tr. 254:23-255:14. Basic growth rate models such as the Ricker model and the Beverton-Holt model were developed in the 1950s. 4/6/10 Tr. 41:22-42:4; 49:16-22.

b. Dr. Deriso testified that sufficient data existed at the time of the creation of the BiOp to enable FWS to perform a quantitative life-cycle modeling analysis. 4/6/10 Tr. 46:16-47:16.

c. Dr. Deriso testified that a basic quantitative life-cycle modeling analysis could be performed in less than an hour, while a more complicated modeling effort could be completed in a few weeks. 4/6/10 Tr. 43:2-7.

d. Mr. Feyrer testified that FWS could have completed a life-cycle modeling analysis within 18

months. 4/2/10 Tr. 263:15-24.

e. In a 2005 research article Dr. Bennett employed a life-cycle model to evaluate a number of impacts on the delta smelt. 4/2/10 Tr. 46:16-47:16.

f. Dr. Hilborn testified that a life-cycle modeling effort could have been performed for the delta smelt within a matter of months. 4/5/10 Tr. 175:5-21. He further testified that even an incomplete life-cycle modeling analysis, such as the one found in Bennett (2005), would be superior to simply relying on professional or expert opinion without use of any such model. 4/5/10 Tr. 212:23-213:6. However, Dr. Hilborn admitted that when he and Dr. Maunder actually endeavored to build a quantitative population dynamics model for delta smelt over 18 months ago, they abandoned that particular modeling effort as too complicated and time-consuming. *Id.* at 217-18.

g. Dr. Punt stated "[i]t is surprising that a population dynamics model was not developed for delta smelt for the BiOp.... The model developed by Bennett could have been extended to more fully account for the biology of delta smelt and fitted to data to assess the population-level effects of impact of the project." 4/6/10 Tr. 44:16-21; Doc. 633, Ex. A, at 3.

89. Yet, a quantitative population dynamics model for delta smelt is "not something that you go to the store and just buy [like] a piece of equipment," but rather would consist of a large amount of formulas. 4/2/10 Tr. 254; 4/5/10 Tr. 48 (Dr. Newman concurring that "there's not off-the-shelf software to build such models"). Dr. Newman testified that previous efforts to build such models in which he has been involved have taken two to three years, 4/5/10 Tr. 50, and have involved numerous people because you need expertise in biology, statistics, and modeling. *Id.* at 131. Mr. Feyrer stated that "the construction of a full blown high quality life cycle model is no simple task." 4/2/10 Tr. 255, 258.

90. Mr. Feyrer also pointed out the importance of constructing an appropriate and well-calibrated model: "even for individuals with the amazing skills of [Drs. Maunder, Deriso and Hilborn], it still takes a lot of time to develop those to where you have the confidence in them so that you can actually apply them in a situation where, you know, there's obviously a lot at stake here. You don't want to apply something prematurely without really understanding how well it works." *Id.* at 258. Dr. Deriso, in contrast, applied a generic "textbook"

version of a life history model in the analysis he presented to the Court, without modifying it to apply specifically to delta smelt biology and characteristics. 4/6/10 Tr. 42. Significant disagreement exists among competent experts as to what constitutes a reliable quantitative population dynamics model for delta smelt.

91. Federal Defendants were aware of the value of a life-cycle model. At a March 8, 2007 meeting regarding the OCAP ESA Re-consultation, attended by a number of FWS employees, the importance of using a life cycle model was recognized and the progress to date was inquired into. 4/7/10 Tr. 183:9-188:4; SWC Ex. 960. Likewise, during the Delta Smelt Action Evaluation Team meeting on August 8, 2008, the Team recognized that population models for delta smelt already had been developed, and that it was possible to use those models as a starting point for quantitative analyses with appropriate assumptions added as bounds to the analysis. 4/7/10 Tr. 188:9-190:22.

92. Nevertheless, it is undisputed that, despite over three years of controversy regarding the species, no quantitative life cycle model adapted to the delta smelt was available to or used by FWS at the time the BiOp was issued. A quantitative population dynamics model for delta smelt does not currently exist, although there are

several efforts underway to develop one. 4/2/10 Tr. 189; 4/5/10 Tr. 44. Researchers from a number of universities, including Drs. Wim Kimmerer, Bill Bennett, Kenny Rose and Steve Monismith, have been working on developing such a model for a number of years. *Id.* at 189-90; 4/5/10 Tr. 46. Dr. Mark Maunder has also been working on such a model for delta smelt since at least March 2008, with the assistance of Dr. Hilborn and Dr. Deriso. *Id.* at 258; 4/5/10 Tr. 47. Dr. Newman, who has previously developed three quantitative life history models, is currently working with the National Center for Ecological Analysis and Synthesis ("NCEAS") to develop one for delta smelt, an effort that has been underway since October 2007. 4/5/10 Tr. 44-46.

93. No party who participated in the preparation of the BA or commented on the public review drafts of the BiOp submitted a quantitative life cycle model or the results of such an analysis using a life cycle model for delta smelt to FWS during the consultation. 4/5/10 Tr. 16-18.

94. It is notable that FWS did make use of the relatively simple and limited life-cycle model described by Dr. Bennett in his 2005 paper. 4/2/10 Tr. 256-57. It utilized that existing model by conducting the effects

analysis in the BiOp according to a similar conceptual life-cycle model. *Id.* at 258. The agency then conducted analyses on specific components of those life stages that would be affected by the proposed Project operations. *Id.* Dr. Hilborn asserts that FWS erred by not using the Bennett model to justify the export limitations in the RPA, 4/5/10 Tr. 241, but the Bennett 2005 paper and Dr. Bennett himself cautioned that the life-cycle model it presented is "premature for management purposes." *Id.* at 18, 115, 240-41.

95. In sum, although all agree that a quantitative life-cycle model would help FWS evaluate impacts on delta smelt, FWS had not developed an appropriate model, and no such model was available for FWS's use (or otherwise presented to FWS) prior to the issuance of the BiOp.

d. Incidental Take Statement.

96. Plaintiffs included proposed findings of fact concerning FWS's formulation of the Incidental Take Statement ("ITS"). However, at the evidentiary hearing, Plaintiffs abandoned their request to enjoin implementation of the ITS. 4/7/10 Tr. 243-44 ("Plaintiffs do not seek modification of the incidental take limit at this time. Even though the current low ITS limits are not supported by the data and application of

quantitative population dynamics analysis, that very conservative limit, Your Honor, plaintiffs believe will serve as a back stop that will provide an additional level of assurance to the Court that during the component two period, which ends in June, the survival of the smelt will not be jeopardized by project operations.").

e. Critical Habitat.

97. Federal Defendants and Defendant Intervenors maintain, in the alternative, that negative OMR flows adversely modify critical habitat and Component 2 can be upheld because it addresses this adverse modification. 4/7/10 Tr. 272:8-273:3; 4/6/10 Tr. 93:2-6; 4/5/10 Tr. 225:18-226:22.

98. However, the specific quantitative criteria established for RPA Component 2 are not derived from or justified by any independent analysis of adverse modification of delta smelt critical habitat. BiOp at 344-68.

99. Discussion of habitat in the justifications for RPA Components 2 defines habitat solely in terms of entrainment risk. BiOp at 344-368. The only quantitative analysis of entrainment risk is found in Figures B-13 and B-14 of the BiOp. BiOp at 348, 350.

f. **Indirect Harm.**

100. Federal Defendants claim that Component 2 also protects against indirect harm. However, the quantitative analysis used to derive the flow levels does not mention indirect harm as a basis for the flow restrictions imposed.

g. **The Role of RPA Component 2 in Avoiding Jeopardy to the Species and Adverse Modification of Critical Habitat.**

101. All of the experts qualified in delta smelt biology concurred that enjoining parts or all of Component 2 would cause jeopardy or adverse impacts to delta smelt and designated critical habitat.

102. Dr. Grimaldo explained that entrainment risk is particularly high from March to May because delta smelt larvae and juveniles are most likely to behave like neutrally buoyant particles during this time period. 4/7/10 Tr. 68.

103. Ms. Goude testified that the Projects exert a direct entrainment effect on delta smelt, as well as indirect impacts upon the species' food supply, risk of predation, and exposure to contaminants and other stressors, and affect critical habitat by changing the amount and location of habitat in winter, spring and fall. *Id.* at 150-51. In her opinion, enjoining Action 3

of the RPA would result in irreparable harm to the delta smelt due to very low abundance levels and the risk of a "huge" entrainment event causing "catastrophic events." *Id.* at 169-70.

104. However, none of these experts offered any quantitative or qualitative analysis, apart from that discussed above, which utilized raw salvage data, to specifically justify the imposition of a -5,000 cfs ceiling on negative OMR flows.

h. Alternative Proposal to Limit negative OMR Flow to -5,600 cfs.

105. Plaintiffs suggest imposition of a -5,600 ceiling on OMR flows. This is based entirely on Dr. Deriso's analysis of population-indexed salvage rates versus negative OMR flows. Although Dr. Deriso's analysis corrects for the fundamental error of relying on raw salvage figures, given the large number of variables not accounted for in Dr. Deriso's analysis, it is unclear whether the -5,600 break-point he suggests is any more or less appropriate as a ceiling than the -5,000 figure utilized in the BiOp.

106. Mr. Feyrer opined that operating the Project pumps to meet OMR flows no less negative than -5,600 cfs, the alternative OMR ceiling proposed by Plaintiffs, during the spring would not avoid jeopardy to the delta

smelt or adverse modification of its critical habitat. 4/2/10 Tr. 208.

107. Regardless of the appropriate upper limit for negative OMR flows, RPA Component 2 defines a range of OMR flows within which the Projects may operate during designated time periods. This range of flows "provides flexibility in [] water operations [and] the ability to be protective when their conditions are not favorable -- or when entrainment risk increases.... So it maximizes protection for the species while providing flexibility for water operations." 4/7/10 Tr. 66-67. According to Dr. Grimaldo, operating to a "unitary" flow, as recommended by Plaintiffs, "removes your flexibility from managing that risk":

> So there may be times when the fish become distributed in the south Delta or the central Delta. And perhaps a lot of them, like we saw in April 2002 and April 2003 were large number of the larvae were in the central and south Delta. If you were at a fixed number, that your risk would be high and you would have substantial losses, which were demonstrated in Kimmerer 2008 during that time period.

Id. at 67.

108. Both the BiOp and subsequent peer reviews have acknowledged that the specific OMR flow triggers and the implementation of the OMR-flow related requirements of the RPA "need[] to be accompanied by careful monitoring,

adaptive management and additional analyses that permit regular review and adjustment of strategies as knowledge improves." 4/2/10 Tr. 195; BiOp at 279 ("[t]he specific flow requirements, action triggers and monitoring stations prescribed in the RPA will be continuously monitored and evaluated consistent with the adaptive process. As new information becomes available, these action triggers may be modified without necessarily requiring re-consultation on the overall proposed action.").

109. Although the record shows that FWS's -5,000 OMR ceiling is not based on the best available science, the record does not contain sufficient information to conclude that the imposition of Plaintiff's suggested -5,600 OMR ceiling would be sufficiently protective of the smelt, particularly in light of the fact that Plaintiffs do not propose any flexibility in the management regime that would permit greater restrictions if a large salvage event was approaching or ongoing.

110. Providing flexibility to permit adaptive management for delta smelt is justified.

D. Irreparable Harm.

111. The record evidence has established a variety of adverse impacts to humans and the human environment from

reduced CVP and SWP deliveries, including irretrievable resource losses (permanent crops, fallowed lands, destruction of family and entity farming businesses); social disruption and dislocation; as well as environmental harms caused by, among other things, increased groundwater consumption and overdraft, and possible air quality reduction.

(1) **Water Supply Impacts.**

112. Any lost pumping capacity directly attributable to the 2008 Smelt BiOp will contribute to and exacerbate the currently catastrophic situation faced by Plaintiffs, whose farms, businesses, water service areas, and impacted cities and counties, are dependent, some exclusively, upon CVP and/or SWP water deliveries.

113. Every acre-foot of pumping foregone during critical time periods is an acre-foot that does not reach the San Luis Reservoir where it can be stored for future delivery to users during times of peak demand in the water year.

114. It is undisputed that, in the three water years prior to the 2009-2010 water year, California has experienced three consecutive years of drought conditions. Gov't Salmon Ex. 5 at (internal) Exhibit 1 at 18. This influences the amount of run-off forecasted

for 2010 and is indicative of why reservoir storages were at a low state entering the 2009-2010 water year. 4/1/10 Tr. 208:7-15. Hydrologic conditions are not within the control of the parties and have materially contributed to water service reductions to contractors.

115. It is also undisputed that other, non-project factors, such as tides, wind events, storm surges, San Joaquin River flows, Contra Costa Water District operations, and diversions by in-Delta water users effect how Reclamation must operate the project to meet flow targets. *See id.* at 202:12-204:1.

116. The projects are subject to export reductions required to protect species listed under the California Endangered Species Act, including longfin smelt, delta smelt, winter-run Chinook salmon, and spring-run Chinook salmon, which subject the water project operators to controls under state law that are similar, and, in some cases, identical to those contained in the 2008 Smelt BiOp and the National Marine Fisheries Service's ("NFMS") June 4, 2009 Biological Opinion ("2009 Salmonid BiOp") concerning various ESA-listed anadromous and oceanic species. *See id.* at Tr. 212:4-213:8. In the absence of the BiOps' RPAs, those protections are argued to have likely limited export pumping to levels below those

allowable under State Water Resources Control Board Decision 1641 ("D-1641"), which also limits Project pumping at certain times of the year. *See, e.g.*, SWC Ex. 938 (DWR's 3/30/10 allocation announcement considered several "SWP operational constraints" including "the incidental take permit for longfin smelt").

117. Plaintiffs' estimates of water losses do not account for or otherwise offset losses attributable to proposed remedies in the consolidated Delta Smelt and Salmon cases. *See* 4/7/10 Tr. 17:10-20:14.

118. The quantity of exportable water has been reduced by the implementation of the Salmonid and Smelt BiOp's RPAs. *Id.* From January 20 through March 24, 2010, Mr. Erlewine testified that potential and actual exports were diminished by 522,561 acre feet ("AF"), of which a 433,000 AF loss was attributable to the SWP and a 89,000 AF loss was attributable to the CVP. 4/6/10 Tr. 185:16-19; SWC Demonstrative Ex. 903.

119. DWR made its initial water supply allocation announcement on November 30, 2009, allocating 5% of Table A contracted amounts for SWP water contractors. 4/6/10 Tr. 240:16-22; SWC Ex. 923, Ex. B. As of March 30, 2010, DWR increased the SWP allocation for 2010 to 20%. 4/6/10 Tr. 189:15-17; SWC Ex. 938; 4/1/10 Tr. 249:22-25. On

April 23, 2010, DWR again increased its allocation of SWP deliveries to 30%. *See* Doc. 323-2 (DWR Press Release).

120. Reclamation announced its initial allocation of CVP water on February 26, 2010. Fed. Gov't Salmon Ex. 5 (Third Milligan Decl.) at ¶11. Under the 90% exceedance forecast, Reclamation allocated CVP agricultural users 5% of their contract amounts, and CVP municipal and industrial ("M&I") contractors 55% of their contract amounts. *Id.* at ¶12. Under the 50% exceedance forecast, north-of-Delta agricultural and M&I contractors were allocated 100% of their contract amounts, while south-of-Delta agricultural contractors were allocated 30% and M&I contractors 75%. *Id.*

121. CVP water users faced similar reductions to their individual allocations. Farmers on the west side of the San Joaquin Valley have received reduced CVP water supply allocations in the 2007-2008, 2008-2009, and 2009-2010 water years, and face similar reductions in 2010-2011. SLDMWA Ex. 153 at ¶3; SLDMWA Ex. 154 at ¶4; SLDMWA Ex. 156 at ¶4. In 2007-2008, Reclamation allocated to Westlands 40% of its contract supply. In 2008-2009, that allocation was 10%. SLDMWA Ex. 155 at ¶8. For the 2009-2010 water year, Westlands was advised the initial allocation was zero percent. SLDMWA Ex. 155 at ¶9.

122. On March 16, 2010, Reclamation raised the allocation for south-of-Delta agricultural users to 25% under a 90% forecast and 30% under a 50% forecast. 4/1/10 Tr. 210:14-22; Fed. Gov't Salmon Exh. 13.

123. These incremental increases do not alter the fact that water deliveries will likely increase further if the two RPAs are enjoined. 4/1/10 Tr. 213:14-20 (acknowledging that deliveries would increase by 5% - 10% if the RPAs were enjoined).

124. The quantity of water lost through pumping reductions translates directly into water losses for urban and agricultural water users. In the SWP service area, one acre-foot of water serves about five to seven people for one year. 4/6/10 Tr. 186:25-187:1-3. An SWP loss of 433,000 AF, if available to urban users, would have supplied approximately 2.6 million people for one year. 4/6/10 Tr. 187:8-11. Seventy-five to eighty-five percent of SWP supply is provided for urban uses, with the remainder provided to agricultural users. 4/6/10 Tr. 187:15-17. The Metropolitan Water District of Southern California alone serves approximately 20 million urban users.

125. Water loss for agricultural users results in reduction in the number of acres that may be sustained

with actual water supply. Water duty is the amount of water that a crop needs per acre for a growing season. 4/6/10 Tr. 187:21-22. DWR information indicates that for the SWP service area, the water duty is approximately three AF per acre. 4/6/10 Tr. 187:22-25. If 433,000 AF were withheld from almond crops, for example, almond production would be reduced by approximately 140,000 acres. 4/6/10 Tr. 188:1-4.

126. Reduced CVP and SWP water supply allocations have increased the cost of supplemental water. Farmers have been forced to purchase supplemental water at drastically increased cost. SLDMWA Ex. 154 at ¶7; SLDMWA Ex. 155 at ¶17; SLDMWA Ex. 156 at ¶6. Since 2007, the cost of securing supplemental water has more than tripled. SLDMWA Ex. 156 at ¶6; SLDMWA Ex. 154 at ¶7. As of January 2010, the cost for buying replacement water for transfer in a dry year is at least $300 per acre foot, plus transportation costs. SLDMWA Ex. 157 at ¶12.

127. Increased water allocations may lessen this increased cost, and will mitigate anticipated harms from reduced water allocations. Farmers anticipate that increased water allocations would mitigate anticipated damage to crops in proportion to the amount of water received and prevent further layoffs of farm employees.

SLDMWA Ex. 156 at ¶10.

128. In 2009, the Federal Defendants accounted for actions taken under the Delta smelt biological opinion as (b)(2) actions, pursuant to section 3406(b)(2) of the CVPIA. 4/1/10 Tr. 213:24-214:2. Federal Defendants have indicated their intent to follow the same accounting procedure for federal export reductions related to both BiOps in 2010, to the extent that (b)(2) assets are available at the time the action is taken. *Id.* at 214:3-7.

(2) Other Resource Impacts Caused or Exacerbated by the 2008 Smelt BiOp RPA Actions.

129. Plaintiffs attribute a number of other human impacts to reductions in the water supply. There is considerable dispute among the parties regarding the extent to which the 2008 Smelt BiOp RPA is responsible for these other impacts. It is undisputed that the RPA is, at the very least, exacerbating the following impacts.

(1) Permanent Crops.

130. Reductions in the quantity of water supply deliveries have resulted in changes to farming practices, including an increased reliance on permanent crops. SLDMWA Ex. 154 at ¶6; SLDMWA Ex. 155 at ¶¶ 18, 22; SLDMWA

Ex. 157 at ¶11.

131. Permanent crops place farmers at greater risk than row crops, as farmers cannot cut back on the water to permanent crops without destroying them. SLDMWA Ex. 154 at ¶6; SLDMWA Ex. 155 at ¶¶ 18, 22; SLDMWA Ex. 157 at ¶11.

(2) Fallowed Lands.

132. Because of reduced water forecasts and uncertainty regarding future water supply, farmers have fallowed hundreds and thousands of acres of fields. SLDMWA Ex. 155 at ¶10; SLDMWA Ex. 153 at ¶3; SLDMWA Ex. 156 at ¶5.

133. Fallowed lands and reduced water supply have caused the loss of thousands of acres of crops. Todd Allen, a third-generation farmer in Fresno County, was able to salvage and harvest only 40 acres of a wheat crop out of a total arable 616 acres on his farm in 2009. SLDMWA Ex. 153 at ¶3.

134. For every 1,000 AF of water lost by the San Luis Plaintiffs' member agencies, approximately 400 acres of land may remain out of production. SLDMWA Ex. 157 at ¶13.

135. Fallowing fields also negatively impacts the air quality of the San Joaquin Valley by increasing dust and

particulate matter. SLDMWA Ex. 155 at ¶20. Reduced air quality in turn impairs major transportation routes through the valley. SLDMWA Ex. 155 at ¶20.

(3) Lack of Access to Credit.

136. The more unreliable the water supply, the more difficult it is for farmers to secure necessary financing for their farming operations. SLDMWA Ex. 153 at ¶4; SLDMWA Ex. 154 at ¶13; SLDMWA Ex. 155 at ¶26; SLDMWA Ex. 156 at ¶7; SLDMWA Ex. 157 at ¶15. In some cases, lenders deny loan applications because of a lack of reliable water supply. SLDMWA Ex. 153 at ¶4; SLDMWA Ex. 154 at ¶13; SLDMWA Ex. 155 at ¶26; SLDMWA Ex. 156 at ¶7; SLDMWA Ex. 157 at ¶15. In others, lenders' concerns about availability to lands irrigated by federally-supplied water has required farmers to make a 50% down payment to secure any loans. SLDMWA Ex. 156 at ¶7.

(4) Social Disruption and Dislocation.

137. It is undisputed that farm employees and their families have faced devastating losses due to reductions in the available water supply. The impact on the farm economy from the combination of a three-year drought and diversion limitations relating to the delta smelt has already been severe. SLDMWA Ex. 157 at ¶14.

138. Lost water supply has decreased the number of

productive agricultural acres, which has resulted in reductions in employee hours, salaries, and positions, devastating farm employees and their families. SLDMWA Ex. 154 at ¶11; SLDMWA Ex. 156 at ¶8.

139. The removal of 250,000 acres from production translates to a loss of approximately 4,200 permanent agricultural worker positions. SLDMWA Ex. 155 at ¶19. Water shortages also cause jobs to be lost in agriculture-related businesses, such as packing sheds, processing plants, and other related services. *Id.* The projected agriculture-related wage loss for the San Joaquin Valley stands at $1.6 billion. *Id.*

140. Dr. Michael, Defendant Intervenors' economist with expertise in regional and environmental economics, counters that "[a]lthough water impacts have affected parts of the west side, there is no evidence that reduced water deliveries have had a severe effect on farm or non-farm employment in the Central Valley as a whole." D-I Exh. 1006 (Michael Decl.) ¶10. Instead, it is a combination of factors, including the three-year drought, the global economic recession, the foreclosure crisis, and the collapse of the real estate market and construction industry, not RPA Component 3, that are mainly driving crop and job losses, food bank needs, and

credit problems in the Central Valley. *Id.* at ¶¶ 6-10. Dr. Michael estimates that ESA-related pumping restrictions have resulted in the loss of less than 2,000 jobs. *See id.* at ¶4.

141. Unemployment has led to hunger on the west side of the San Joaquin Valley. SLDMWA Ex. 158 at ¶8. The Community Food Bank, serving Fresno, Madera and Kings Counties, estimates 435,000 people in its service area do not have a reliable source of food. SLDMWA Ex. 158 at ¶4. The Chief Executive Officer of the Community Food Bank, Dana Wilkie, believes that hunger in the communities served by the Food Bank in the western San Joaquin Valley will continue to increase in 2010 because of ongoing water shortages. SLDMWA Ex. 158 at ¶5. Ms. Wilkie understands that at least 42,000 people served by the Food Bank in October 2009 were employed by farm-related businesses before losing their jobs. SLDMWA Ex. 158 at ¶8.

(5) Groundwater Consumption and Overdraft.

142. Reductions in the available water supply have caused water users to increase groundwater pumping in attempts to make up the difference between irrigation need and allocated water supplies. SLDMWA Ex. 155 at ¶¶ 4, 7; SLDMWA Ex. 157 at ¶10; 4/6/10 Tr. 216:6-7.

143. However, groundwater is not always available, and cannot be used in all areas or for all crops. SLDMWA Ex. 155 at ¶11. Increased groundwater pumping reduces the quality of water applied to the soil by increasing soil salinity. SLDMWA *Id.* at ¶15. Not all fields and crops can be irrigated with groundwater. *Id.* at ¶¶ 11, 15.

144. Increased reliance on and overuse of groundwater has caused groundwater overdraft, which occurs when pumping exceeds the safe yield of an aquifer. *Id.* at ¶12. Overdraft causes increased land subsidence and potential damage to CVP conveyance facilities, *id.* at ¶¶ 12-13, although it is not clear that any subsidence of Project facilities has occurred as a result of the implementation of the 2008 Smelt BiOp RPA Actions, as the only reported incident of subsidence at a SWP conveyance facility predates current implementation, 4/7/10 Tr. 16:1-13.

145. Increased groundwater pumping also increases demand for energy. SLDMWA Ex. 155 at ¶16. Due to the falling water table, wells require increased amounts of energy. *Id.* Westlands estimates that pumping of groundwater in 2009 required approximately 425,000,000 kWh. *Id.* Adverse environmental impacts are associated

with such increased demand for and use of energy. *Id.*

146. Increased groundwater pumping has depleted groundwater reserves. Groundwater reserves that were at 2 million AF in the beginning of 2007 are now less than 900,000 AF. 4/6/10 Tr. 216:21-24. Within MWD's service area, storage levels are at 1.3 million AF, about half of normal storage levels. 4/6/10 Tr. 217:4-8.

(6) Related, Recent Impacts on Naval Air Station Lemoore.

147. Captain James Knapp testified as a fact witness on behalf of Naval Air Station Lemoore, which is located approximately 30 miles south of Fresno, eight miles west of the town of Lemoore, California. 4/7/10 Tr. 208:12-14. Its daytime population is approximately 14,000 people, including residents, who are sailors and dependent families. *Id.* at 208:15-21.

148. The air station's location was selected at a time when the Navy was transitioning from propeller-driven aircraft to jet aircraft, the latter being incompatible with urban environments such as the Naval Air Station Alameda in the San Francisco Bay Area. *Id.* at 211:17-212:21. The air station's 18,000 acres of agriculture-compatible land and neighboring land under permanent agricultural easements help to ensure there will be no urban build-out to interfere with the Navy's

operations. *Id.* at 211:17-212:21, 213:2-19. From its location, the installation supports aircraft carrier activities along the Pacific Coast. *Id.*

149. Active agricultural operations on the air station's 18,000 acres and in the surrounding areas also serve "to control bird and animal strike hazards, grass fires, rodent activity, dust, and the release of Coccidioidomycosis (Valley Fever) spores carried by dust." SLDMWA Ex. 390 at p. 3. These risks are interrelated; for example, fallowed fields attract rodents and predatory birds. 4/7/10 Tr. at 213:10-25. An increased bird presence increases the chances of bird strikes by naval aircraft. *Id.* at 214:1-6.

150. Ongoing agricultural activities are vitally important to the Navy's ability to safely train and support flight operations at Naval Air Station Lemoore. 4/7/10 Tr. at 214:7-24; SLDMWA EX. 390 at p. 2.

151. Lemoore Naval Air Station's principal source of municipal, industrial, and agricultural water is Westlands Water District. 4/7/10 Tr. 208:24-209:2.

152. The past water year began with a zero percent water allocation which increased to a ten percent allocation, resulting in 6,000 acres of fallow fields. SLDMWA Ex. 390 at p. 3. Pilots training at low altitude

witnessed an increase in bird activity, with one aircraft suffering thousands of dollars in damage as a result of a bird strike. *Id.*

43. Captain Knapp testified that Naval Air Station Lemoore had requested and received emergency supplemental water allocations from Reclamation for these properties. *Id.* at 210, 217-18; SLDMWA Ex. 391.

44.This post-record evidence is received for the limited purpose of showing the action agency's ability to respond to conditions that pose imminent harm to the human environment.

(3) Harm to Species.

45. To the extent such information is in the record, the potential harms to the species of enjoining Component 2 (Action 3) are discussed above.

VI. CONCLUSIONS OF LAW

A. Jurisdiction.

1. Jurisdiction over claims brought under NEPA exists under 28 U.S.C. § 1331 (Federal Question) and the Administrative Procedure Act ("APA"), 5 U.S.C. § 702 et seq. Jurisdiction over the ESA claims exists under the ESA citizen-suit provision, 16 U.S.C. § 1540(g)(1)(A). Personal jurisdiction over all the parties exists by virtue of their participation in the lawsuit as

Plaintiffs, Defendants, and Intervenors.

B. Likelihood of Success on the Merits: NEPA Claims.

2. Plaintiffs have already succeeded on their NEPA claim. *See* Doc. 399.

3. NEPA insures that federal agencies "make informed decisions and 'contemplate the environmental impacts of [their] actions.'" *Ocean Mammal Inst. v. Gates*, 546 F. Supp. 2d 960, 971 (D. Hi. 2008) (quoting *Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1149 (9th Cir. 1998).

4. "NEPA emphasizes the importance of coherent and comprehensive up-front environmental analysis to insure informed decision-making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct." *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1166 (9th Cir. 2003).

5. Federal Defendants' violations of NEPA prevented the required reasonable evaluation, analysis, "hard look at," and disclosure of the harms of implementing the 2008 Smelt BiOp RPA Actions to human health and safety, the human environment, and other environments not inhabited by the delta smelt.

6. Harms that have been caused by RPA water supply

reductions include but are not limited to: destruction of permanent crops; fallowed lands; increased groundwater consumption; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crime and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness.

7. Where a federal agency takes action in violation of NEPA, "that action will be set aside." *High Sierra Hikers Ass'n v. Blackwell*, 390 F.3d 630, 640 (9th Cir. 2004).

8. However, a court may not issue an injunction under NEPA that would cause a violation of other statutory requirements, such as those found in section 7 of the ESA. *See United States v. Oakland Cannabis Buyers' Coop.*, 532 U.S. 483, 497 (2001) ("A district court cannot, for example, override Congress' policy choice, articulated in a statute, as to what behavior should be prohibited."). Nor should an injunction issue under NEPA when enjoining government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems v. Clarke*, 747 F.2d 1240, 1250 (9th Cir. 1984); *Am. Motorcyclist Ass'n v. Watt*, 714

F.2d 962, 966 (9th Cir. 1983) (holding public interest does not favor granting an injunction where "government action allegedly in violation of NEPA might actually jeopardize natural resources"); *Alpine Lakes Prot. Soc'y v. Schlapfer*, 518 F.2d 1089, 1090 (9th Cir. 1975) (denying injunctive relief in NEPA case where more harm could occur to forest from disease if injunction was granted).

C. Likelihood of Success on the Merits: ESA Claims.

(1) Legal Standards.

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

a. Record Review.

10. A court reviews a biological opinion "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. FWS*, 273 F.3d 1229, 1245 (9th Cir. 2001). Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA*, 615

F.2d 794, 811-12 (9th Cir. 1980).

11. 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).

12. Here, the Court has considered expert testimony only for explanation of technical terms and complex subject matter beyond the Court's knowledge; to understand the agency's explanations, or lack thereof, underlying the RPA; and to determine if any bad faith existed.

b. Deference to Agency Expertise.

13. The 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. NMFS*, 422 F.3d 782, 798 (9th Cir. 2005). The 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.

14. Although deferential, judicial review under the APA "is designed to ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas*, 824 F.2d 745, 748 (9th Cir. 1987) (internal citations omitted). "The deference accorded an agency's scientific or technical expertise is not unlimited." *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir. 2001) (internal citations omitted). Deference is not owed when "the agency has completely failed to address some factor consideration of which was essential to making an informed decision." *Id.* (internal citations and quotations omitted).

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

Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983); *see also Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402,

416 (1971) ("A 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.").

c. General Obligations Under the ESA.

15. 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).

16. 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 Nat'l Wildlife Fed'n v. NMFS*, 524 F.3d 917 (9th Cir. 2008) ("*NWF v. NMFS II*") (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. *Id.* at 931.

17. "[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.

18. 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).

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

action affects the species or its critical habitat." 16 U.S.C. § 1536(b)(3)(A); *see also* 50 C.F.R. § 402.14(h).

20. If FWS determines that jeopardy or destruction or adverse modification of critical habitat is likely, FWS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate subsection (a)(2) of this section and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A). "Following the issuance of a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to 16 U.S.C. § 1536(e)." *National Ass'n of Home Builders v. Defenders of Wildlife*, 551 U.S. 644, 652 (2008).

d. Best Available Science.

21. 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."). "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). A failure by the agency to utilize the best available science is arbitrary and capricious. *See Gutierrez II*, 606 F. Supp. 2d at 1144.

22. 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).

23. The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne*, 530 F.3d 991, 998 (D.C. Cir. 2008) (citation omitted).

24. 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 by the en banc panel of the Ninth Circuit 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." *Id.* 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).

25. This deference extends to the use and interpretation of statistical methodologies. As explained by the D.C. Circuit in *Appalachian Power Co. v. EPA*, 135 F.3d 791 (D.C. Cir. 1998), 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.

26. More generally, "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council*, 537 F.3d at 1000 (quoting *Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 378 (1989)).

27. Mere uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1337 (9th Cir. 1992) (upholding biological opinion, despite uncertainty about the effectiveness of management measures, because decision was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt*, 128 F. Supp. 2d 1274, 1300 (E.D. Cal. 2000) (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits the [FWS] to take action based on imperfect data, so long as the data is the best available").

28. The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar*, 566 F.3d 870, 879 (9th Cir. 2009), held that an agency may not rely on "ambiguous studies as evidence" to support findings made

under the ESA. Because the studies did not lead to the conclusion reached by FWS, the Ninth Circuit held that these studies provided inadequate support in the administrative record for the determination made by FWS. *Id.; see also Rock Creek Alliance v. U.S. Fish & Wildlife Service*, 390 F. Supp. 2d 993 (D. Mont. 2005) (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion); *Greenpeace v. NMFS*, 80 F. Supp. 2d 1137, 1149-50 (W.D. Wash. 2000) (where agency totally failed to develop any projections regarding population viability, it could not use as an excuse the fact that relevant data had not been analyzed).

29. The presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned. *Greenpeace*, 80 F. Supp. 2d at 1147. Agencies cannot disregard available scientific evidence better than the evidence on which it relies. *Kern County Farm Bureau v. Allen*, 450 F.3d 1072, 1080 (9th Cir. 2006); *S.W. Ctr. for Biological Diversity v. Babbitt*, 215 F.3d 58, 60 (D.C. Cir. 2000).

30. 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 1072 (thoroughly reviewing three post-comment studies and FWS's treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv.*, 529 F. Supp. 2d 1110, 1120 (N.D. Cal. 2007) (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn*, 645 F. Supp. 2d 929 (D. Or. 2007) (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans*, 384 F. Supp. 2d 203, 217-18 (D.D.C. 2005) (carefully considering scientific underpinnings of challenge to Service's use of a particular model, including post decision evidence presented by an expert, to help the court understand a 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).

31. Courts are not required to defer to an agency

conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., Am. Turnboat Ass'n v. Baldrige*, 738 F.2d 1013, 1016-17 (9th Cir. 1984) (NMFS's decision under the Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs*, 701 F.2d 1011, 1030 (2d Cir. 1983) ("court may properly be skeptical as to whether an EIS's conclusions have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[]") (internal citations omitted). A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation." *N. Spotted Owl v. Hodel*, 716 F. Supp. 479, 483 (W.D. Wash. 1988) (citing *Am. Turnboat Ass'n*, 738 F.2d at 1016).

32. 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. In rejecting this defense, the court 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 it noted that FWS could have completed more analysis with the information that was available. *Id.* at 1454 (emphasis added). The Ninth Circuit stated:

> 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.

848 F.2d at 1454 (emphasis added).

(2) Environmental Baseline Challenges.

33. The relevant regulatory definition of the "environmental baseline" is provided within the definition of the "effects of the action":

> the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

50 C.F.R. § 402.02.

34. When determining the "effects of the action," the agency first must evaluate the status of the species or critical habitat, which will involve "consideration of the present environment" in which the species or habitat exists as well as "the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat." 51 Fed. Reg. 19,926, 19,932 (June 3, 1986). This evaluation is to serve as the "baseline" for determining the effects of the action on the species or critical habitat. *Id.* However, all of these elements are to be evaluated together as the "effects of the action."

35. If additional data would provide a better information base from which to formulate a biological opinion, the consulting agency (FWS or NMFS) may request an extension of formal consultation and that the action agency obtain additional data to determine how or to what extent the action may affect listed species or critical habitat. 50 C.F.R. § 402.14(f); FWS and NMFS, Endangered Species Consultation Handbook (March 1998) at 4-6.[8]

36. The Ninth Circuit directs the consulting agency to consider the effects of its actions "within the context of other existing human activities that impact

[8] Judicial notice may be taken of this Handbook, which is available at: http://www.fws.gov/endangered/consultations/s7hndbk/s7hndbk.htm.

the listed species." *NWF v. NMFS II*, 524 F.3d at 930. "[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." *Id.* The relevant jeopardy analysis is whether this Project will tip a species into a state of "likely extinction." 524 F.3d at 930.

> 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. 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." [citation]. 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." [citation].

Id. (footnote omitted).

37. Plaintiffs' essential critique of the BiOp's baseline analysis is that the BiOp improperly concluded

that "CVP and SWP operations exacerbate the effects of other factors, such as food or predation on the delta smelt." *See* Doc. 667, Pltf's Proposed Conclusions of Law ## 316-18. [9] Plaintiffs argue "FWS simply determined that these factors are attributable to CVP and SWP operations" and therefore "based the effects analysis of the 2008 BiOp upon an unreasoned premise." *Id.* at Proposed Conclusion of Law # 343.

38. Plaintiffs are correct that the general assertion that Project operations exacerbate the effects of these other stressors is unsupported by the record. However, the inclusion of this unsupported assertion does not invalidate the BiOp's baseline analysis. BiOp at 140-189. FWS does discuss "other stressors" at length in the BiOp. *See, e.g., id.* at 182-88, 198, 201-2. Specifically, FWS considered the effects of "predation, contaminants, introduced species..., habitat suitability, food supply, aquatic macrophytes, and microcystis." *Id.* at 202, 277. The CVP and SWP are not identified as the

[9] Plaintiffs' motion for preliminary injunction specifically addresses the treatment of hatcheries and gravel loss below Whiskeytown Dam. Doc. 164 at 11-12. However, this issue was not presented or discussed at the evidentiary hearing or in Plaintiffs' proposed findings. These specific arguments appear to have been abandoned.

Plaintiffs also advance an elaborate argument based on the contention that FWS misapplied the "reasonably certain to occur" standard applicable to "indirect effects" analyses. Because Component 2 is not explicitly justified by any indirect effects analysis, this argument is not directly relevant to the resolution of the pending motion for preliminary injunction.

sole source of the delta smelt's problems. Rather, FWS expressly recognizes that the long-term decline of the species "was very strongly affected by ecosystem changes caused by non-indigenous species invasions and other factors...." *Id.* at 189. The BiOp repeatedly acknowledges that there is "no single primary driver of delta smelt population dynamics," *id.* at 202, but rather that there are "multiple factors" and that "not all are directly influenced by operations of the CVP/SWP." *Id.* at 328.

39. It is undisputed that uncertainty surrounding the measurement of the other stressors makes it difficult (if not impossible) to separate those effects from the effects of joint Project operations. Even if it were possible to separate the quantitative effect of the other stressors, which are part of the environmental baseline, the ESA does not require that FWS quantify and/or parcel out the "proportional share" of harms among the baseline and the proposed action. *See Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation*, 426 F.3d 1082, 1093 (9th Cir. 2005); *see also Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation*, 226 Fed. Appx. 715, 718 (9th Cir. 2007) (rejecting water users' argument that agency action must

be the "historical cause" of the jeopardy to salmon).

40. FWS's treatment of the "other stressors" in the BiOp did not violate the ESA's baseline analysis requirements because the ESA does not demand a quantitative separation of project stressors from non-project stressors. *See NWF v. NMFS II*, 524 F.3d at 930. ("[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."). FWS was required to and did describe the present and future federal, state, and private actions in the action area, which include the "other stressors". Whether it sufficiently justified whether jeopardy might result from the agency's proposed actions viewed in this context is a separate question.

41. It is inequitable to put the entire burden of the stressors on the water supply. However, this decision goes beyond science to implicate the Executive's (Department of Interior) allocation of resources. A court lacks authority to interfere with such a policy choice by a coordinate branch of government.

a. **Discretionary v. Non-Discretionary.**

42. Plaintiffs complain that the BiOp does not distinguish between discretionary and non-discretionary actions. *Home Builders*, 551 U.S. 644, 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.

43. However, *Home Builders* says nothing about whether, once section 7 consultation is triggered, the jeopardy analysis should segregate discretionary and non-discretionary actions, relegating the non-discretionary actions to the environmental baseline. *Home Builders* fundamentally concerns whether the section 7 consultation obligation attaches to a particular agency action at all. *See Home Builders*, 551 U.S. at 679-80 ("duty does not attach to actions... that an agency is required by statute to undertake....") (emphasis added).

b. **Reclamation's Treatment of the Coordinated Operations Agreement.**

The same reasoning applies to Plaintiffs' related argument that Federal Defendants acted unlawfully by attributing to the project the effects of "mandatory" compliance with the Coordinated Operations Agreement

("COA"). Even assuming, *arguendo,* that any mandatory obligation exists under the COA, a proposition that is questionable given the open-ended wording of the COA and language in the CVPIA subjecting project operations to the ESA, *Home Builders* does not require the agency to segregate discretionary from non-discretionary activities during an ESA § 7 consultation.[10] Moreover, this argument was not presented in Plaintiffs' opening brief. *See Alaska Ctr. for Envt. v. U.S. Forest Serv.*, 189 F.3d 851, 858 n. 4 (9th Cir. 1999) (arguments not raised in opening brief are waived).

c. Comparison of CalSim Data against Dayflow Data.

44. Plaintiffs also argue that FWS's analysis is flawed because FWS compared CalSim data to Dayflow Data. As discussed in the Findings of Fact, although Mr. Miller presents some substantive criticisms of the way the BiOp utilized CalSim runs and compared those runs to other types of data, these specific concerns were not raised before the agency prior to the issuance of the BiOp. FWS had legitimate concerns, shared by other scientists, with the exclusive reliance on CalSim data. Finally, Mr. Miller concedes that even if the approach he recommends

[10] To the extent that Plaintiffs suggest that section 7 does not apply to the projects at all under *Home Builders*, this paradigm-shifting argument has not properly been raised or briefed.

had been taken, the same fundamental result would have obtained: project operations shift the position of X2 upstream. The magnitude of this shift is relevant to the justification for and design of Component 3, which takes effect in September, but that need not be resolved at this time.

(3) Effects Analysis Challenges (Food Web).

45. Plaintiffs' original motion attacked the BiOp's analysis regarding *P. forbesi*, a food item for delta smelt during the summer and fall seasons. Doc. 447 at 21-26. Plaintiffs appear to have abandoned this argument, as it was not discussed during the evidentiary hearing or in their proposed Findings of Fact or Conclusions of Law.

(4) Challenges to Component 2.

a. Use of Raw Salvage Numbers.

46. The evidence described in the Findings of Fact establishes that FWS's use of gross salvage numbers to justify the quantitative pumping restrictions in RPA Component 2 did not utilize the best available science.

47. There was agreement among all the experts that the best available, scientifically accepted methodology is to use normalized salvage data to analyze the effect of OMR flows on the delta smelt population. Normalized

salvage data was available to FWS, but FWS failed to incorporate any analysis of normalized salvage data into its quantitative justification for the specific flow prescriptions imposed by RPA Component 2. To exacerbate this failure, FWS did not explain why it did not.

48. FWS's disregard for an available scientific methodology that was "in some way better than the evidence [the agency] relied on" was a violation of the "best available science" standard of the ESA. *Kern County*, 450 F.3d at 1080.

49. Additionally, by entirely failing to explain its use of gross salvage numbers despite internal discussions indicating an awareness of the problem and criticism from the Independent Peer Review, FWS "has entirely failed to articulate a satisfactory explanation for its conclusions." *Gutierrez II*, 606 F. Supp. 2d at 1183.

50. Plaintiffs have shown a likelihood of success on the merits of their claim that the use of gross salvage numbers in Figures B-13 and B-14 of the BiOp was a violation of the ESA, and was arbitrary, capricious, and an abuse of discretion.

51. However, Plaintiffs have not demonstrated that Dr. Deriso's alternative -5,600 cfs flow limit is any more valid than the -5,000 cfs limit imposed by RPA

Component 2. The condition of the delta smelt continues to be non-viable and precarious, with a likely risk of extinction if protections are not afforded. Plaintiffs must produce evidence that shows otherwise to justify a flow restriction that permits negative OMR flows to exceed -5,000 cfs.

b. Failure to Use a Quantitative Life Cycle Model.

52. The agency is not required to generate new studies. For example, in *Southwest Center for Biological Diversity v. Babbitt*, 215 F.3d 58, 60-61 (D.C. Cir. 2000), the district court found the available evidence regarding FWS's decision not to list the Queen Charlotte goshawk "inconclusive" 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.

53. The use of a quantitative life cycle model is the preferred scientific methodology. FWS made a

conscious choice not to use expertise available within the agency to develop one, nor did it explain why it did not. However, a completed life-cycle model was not available for FWS's use prior to the issuance of the BiOp, and the Court does not have the authority to require the agency to create one.

(5) Critical Habitat.

54. As required by the ESA, if FWS finds that the proposed agency action will result in "jeopardy or adverse modification [of critical habitat] ... the Secretary shall suggest those reasonable and prudent alternatives which [it] believes would not violate [Section 7(a)(2)] and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A). Avoiding adverse modification of critical habitat is an independent statutory basis for the promulgation of an RPA.

55. The BiOp sets forth extensive findings regarding the adverse effects of export pumping on the critical habitat of the delta smelt. *See* BiOp at 190-202, 239-78. For instance, the BiOp found that the export pumps "alter the hydrologic conditions within spawning habitat throughout the spawning period for delta smelt by impacting various abiotic factors including the

distributions of turbidity, food, and contaminants," and further adversely modify spawning habitat by "contribut[ing] to upstream movement of the LSZ [low salinity zone]," which in turn "reduc[es] the amount and quality of spawning habitat available to delta smelt." *Id.* at 239-40.

56. In light of such findings, the BiOp concluded that the operations of the CVP and SWP "are likely to adversely modify delta smelt critical habitat" because "[t]he past and present operations of the CVP/SWP have degraded [delta smelt] habitat elements (particularly PCEs 2-4 ["primary constituent elements" – water, water flow, and salinity]) to the extent that their co-occurrence at the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation." *Id.* at 278.

57. Plaintiffs have not challenged the BiOp's findings on adverse modification of critical habitat in this motion. Plaintiffs' experts Dr. Deriso and Dr. Hilborn stated that their criticisms of the BiOp's OMR flow restrictions did not apply to critical habitat. 4/5/10 Tr. 226; 4/6/10 Tr. 93. Rather, Plaintiffs argue that the only stated rationale for the specific flow

prescriptions imposed by Component 2 is to avoid jeopardy, and that Component 2 does not itself indicate that it is necessary to prevent adverse modification. *See* Pls.' Reply (Doc. 491) at 1 n.1.

58. Federal Defendants respond that "[t]his argument elevates form over substance and needlessly compartmentalizes portions of the BiOp that are designed to work together as part of the same document." Doc. 666, Proposed Conclusion of Law #187.

59. As a general matter, Federal Defendants are correct that the BiOp's critical habitat modification finding operates as an independent justification for imposing flow restrictions on the projects. However, the BiOp justifies the specific flow prescriptions imposed by Component 2 with a quantitative analysis that says nothing whatsoever about critical habitat. Rather, an improper analysis of raw salvage data is utilized to generate a series of "break points," including a -5,000 cfs ceiling on negative OMR flows. There is no analysis of critical habitat that independently justifies this specific flow prescription, as opposed to the ceiling of -5,600 proposed by Plaintiffs, or any other level.

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(6) **Reclamation's ESA Responsibility.**

60. The ESA regulations require the action agency 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). Prior to accepting and implementing the 2008 Smelt BiOp RPA, Reclamation had an independent obligation under ESA section 7(a)(2) to ensure that it "use[d] the best scientific and commercial data available."

61. Reclamation, as the federal action agency, "may not rely solely on a FWS biological opinion to establish conclusively its compliance with its substantive obligations under section 7(a)(2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of the Navy*, 898 F.2d 1410, 1415 (9th Cir. 1990). "[T]he action agency must not blindly adopt the conclusions of the consultant agency." *City of Tacoma v. Fed. Energy Regulatory Comm'n*, 460 F.3d 53, 76 (D.C. Cir. 2006).

62. Reclamation did not ensure that the RPA utilized the best available science. Rather, it uncritically accepted the RPA and did not independently identify and analyze alternative RPA Actions that minimized jeopardy to humans and the human environment while protecting threatened species.

D. Balancing of the Harms.

(1) Balancing of the Harms in ESA Cases.

63. The Supreme Court held in *TVA v. Hill*, 437 U.S. 153, 194 (1978), that Congress struck the balance in favor of affording endangered species the highest of priorities. In adopting the ESA, Congress intended to "halt and reverse the trend toward species' extinction, whatever the cost." *Id.* at 184 (emphasis added). *TVA v. Hill* continues to be viable. *See Home Builders*, 551 U.S. at 669-71; *see also Oakland Cannabis Buyers' Co-op.*, 532 U.S. 496-97; *Amoco Prod. Co. v. Village of Gambell*, 480 U.S. 531, 543 n.9 (1987).

64. *Winter* does not modify or discuss the *TVA v. Hill* standard.[11] Although *Winter* altered the Ninth Circuit's general preliminary injunctive relief standard by making that standard more rigorous, *Winter* did not address, nor change, the approach to the balancing of economic hardships where endangered species and their critical habitat are jeopardized. *See Biodiversity Legal Found. v. Badgley*, 309 F.3d 1166, 1169 (9th Cir. 2002) (Congress removed the courts' traditional equitable discretion to balance parties' competing interests in ESA injunction proceedings); *Nat'l Wildlife Fed'n v.*

[11] Although *Winter* involved ESA-listed species, the *Winter* decision did not address any ESA claims.

Burlington N. R.R., Inc., 23 F.3d 1508, 1510-11 (9th Cir. 1994)(same).

65. Prior decisions involving the coordinated projects' operations found that *TVA v. Hill* and related Ninth Circuit authorities foreclose the district court's traditional discretion to balance economic equities under the ESA. There is no such bar in NEPA injunction proceedings.

66. Plaintiffs have advanced a human welfare exception and contend that unlike any of the prior cases, this case juxtaposes species' survival against human welfare, requiring a balancing of the BiOp's threats of harm to humans, health, safety, and protection of affected communities. No case, including *TVA v. Hill*, which concerned the competing economic interest in the operation of a hydro-electric project and prohibited federal courts from balancing the loss of funds spent on that project against the loss of an endangered species, expressly addresses whether the ESA precludes balancing of harms to humans and the human environment under the circumstances presented here.

67. This case involves both harm to threatened species and to humans and their environment. Congress has not nor does *TVA v. Hill* elevate species protection

over the health and safety of humans.

(2) **Balancing the Harms under NEPA.**

68. Although it is undisputed that all harms may be considered in evaluating a claim for injunctive relief under NEPA, an injunction should not issue if enjoining such government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems*, 747 F.2d at 1250.

E. **The Public Interest.**

69. In adopting the ESA, Congress explicitly found that all threatened and endangered species "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." 16 U.S.C. § 1531(a)(3). The ESA advances a Congressional policy to "halt and reverse the trend toward species extinction, whatever the cost." *TVA v. Hill*, 437 U.S. at 184.

70. The public policy underlying NEPA favors protecting the balance between humans and the environment. *See* 42 U.S.C. § 4321 (declaring a national policy to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man;

[and] to enrich the understanding of the ecological systems and natural resources important to the Nation....").

71. If both these objectives can be realized by astute management, it is the government's obligation to do so.

72. It is in the public interest that relief be granted to Plaintiffs, who represent a substantial population of water users in California, to enhance the water supply to reduce the adverse harms of destruction of permanent crops; fallowed lands; increased groundwater consumption; reducing groundwater supplies; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crimes and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness. This must be done without jeopardizing the species and their critical habitat.

VII. CONCLUSION

1. Plaintiffs have succeeded on the merits of their NEPA claim.

a. NEPA requires that the responsible agency take a hard look at the environmental consequences of its

actions, *Robertson v. Methow Valley Citizen's Counsel*, 490 U.S. 332, 350 (1989), obligating federal agencies to prepare an environmental impact statement ("EIS") for all "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C).

b. Federal Defendants are required to evaluate the impact of the coordinated operations of the CVP and SWP, which constitutes major federal action. The evidence overwhelmingly establishes significant detrimental effects visited on the quality of the human environment by implementation of the BiOp's RPA Actions, which impose substantial restrictions on the water supply to California to protect the delta smelt.

c. Where required, an EIS discloses environmental effects of a proposed action and considers alternative courses of action. *Id.* Here, Federal Defendants completely abdicated their responsibility to consider alternative remedies in formulating RPA Actions that would not only protect the species, but would also minimize the adverse impact on humans and the human environment.

d. In considering RPA alternatives, the record shows the burden of other causes is allocated to the

water supply, without the required analysis whether alternatives, less harmful to humans and the human environment, exist. Although this allocation of resources ultimately is the prerogative of the agency, NEPA nevertheless requires a hard look.

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

3. It is highly significant that the co-operator of the Projects, DWR, with access to scientific competence in the fields of fish biology and ecology, and project operations, does not oppose the motion for a preliminary injunction.

4. Under the balance of hardships analysis, Defendants' contention that the ESA, under *TVA v. Hill*, precludes equitable weighing of Plaintiffs' interests is not supported by that case, as evidence of harm to the human environment in the form of social dislocation, unemployment, and other threats to human welfare were not present in *Hill*. They are in this case.

5. Defendants argue that jeopardy to the species cannot be avoided without continuing substantial reduction of pumping, with resultant reduction of water supply to Plaintiffs, representing over 20,000,000 persons, affected communities, and the agricultural industry in Northern, Central, and Southern California.

6. Congress created public expectations in the Amended Reclamation Act by instructing Reclamation to contract for water service to hundreds of public-entity water service providers that supply water to millions of people and thousands of acres of productive agricultural land. The agencies have not fully discharged their responsibility to effectively allocate Project water resources. Federal Defendants have acted arbitrarily and capriciously in formulating Component 2 of the RPA, which lacks factual and scientific justification, while effectively ignoring the irreparable harm that pumping

restrictions have inflicted and will inflict on humans and the human environment.

7. The species and its critical habitats are entitled to protection under the ESA. The species has been and will be protected. That is the law. Nonetheless, FWS and Reclamation, as the consulting and action agencies, must take the hard look under NEPA at the severe consequences visited upon Plaintiffs, the water supply of California, the agricultural industry, and the residents and communities impacted by the water supply limitations imposed by the Component 2. Federal Defendants have failed to comprehensively and competently evaluate whether RPA alternatives can be prescribed that will be mutually protective of all the statutory purposes of the Projects.

8. This is a case of first impression. The stakes are high, the harms to the affected human communities great, and the injuries unacceptable if they can be mitigated. FWS and Reclamation have not complied with NEPA. This prevented in-depth analysis of the potential RPA Actions through a properly focused study to identify and select alternative remedial measures that minimize jeopardy to affected humans and their communities, as well as protecting the threatened species. No party has

suggested that humans and their environment are less deserving of protection than the species. Until Defendant Agencies have complied with the law, some injunctive relief pending NEPA compliance may be appropriate, so long as it will not further jeopardize the species or their habitat.

9. Injunctive relief also may be warranted under the ESA, because, although the general premises underlying Component 2 find some support in the record, the precise flow prescriptions imposed on coordinated project operations are not supported by the best available science and are not explained as the law requires.

10. Injunctive relief cannot be imposed without current 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 Plaintiffs' proposed remedy of a flat -5,600 cfs ceiling on negative OMR flows will not jeopardize the continued existence of the species and/or adversely modify its critical habitat.

11. Legal and equitable grounds for injunctive relief have otherwise been established by a preponderance of the evidence.

12. RPA component 2 suffers from a lack of population scaling in violation of the requirement FWS use the best available science. There is no reliable lifecycle model, which best available science calls for, even if the Court cannot require the agency to develop one. Continuing evidence of the extreme risk to the continued existence of the Delta smelt population has been presented by Defendants. Absent a showing by Plaintiffs that Delta smelt are not within imminent risk of entrainment by Project pumping facilities and/or not within hydraulic influence of the pumps in the danger area of the Central and South Delta, the -5,000 cfs flow restriction cannot be enjoined.

13. A telephonic conference to discuss whether Plaintiffs have evidence that imminence of harm to Delta smelt does not exist to justify injunction of pumping restrictions shall be held May 28, 2010 in Courtroom 3 at 10:00 a.m.

SO ORDERED

Dated: May 27, 2010

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