Appendix 9K

Delta Hydrodynamic Analysis Documentation

This appendix provides information about the methods and assumptions used for the Coordinated Long Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS) analysis using the Delta Hydrodynamic analysis. This appendix is organized into the following sections:

- Section 9K.1: Delta Hydrodynamic Analysis Methodology and Assumptions
  - The Delta Hydrodynamic analysis summarizes 15-minute velocity output from DSM2 over the 82-year simulation period (1922 to 2003). This section briefly describes the approach and assumptions for the Delta Hydrodynamic analysis.
- Section 9K.2: Delta Hydrodynamic Analysis Results
  - This section presents the results of the Delta Hydrodynamic analysis. Results are presented in a series of figures showing the proportion positive velocity for each alternative comparison for five DSM2 Hydro channels.

9K.1 Delta Hydrodynamic Analysis Methodology and Assumptions

9K.1.1 Delta Hydrodynamic Analysis Methodology

For this analysis, 15-minute DSM2 Hydro output (velocity) was summarized over the 82-year simulation period (1922 to 2003) at the midpoint of five DSM2 channels, as follows:

- San Joaquin River mainstem downstream of the Head of Old River (DSM2 channel 21)
- Old River downstream of the facilities (DSM2 channel 212)
- Old River upstream of the facilities (DSM2 channel 94)
- Sacramento River near Georgiana Slough (DSM2 channel 421)
- San Joaquin River mainstem near the confluence with the Mokelumne River (DSM2 channel 45)

DSM2 output is summarized as the proportion of 15-minute observations with a value greater than 0 feet/second (proportion positive velocity). The proportion positive velocity is selected as the hydrodynamic metric because there is evidence that juvenile anadromous fish selectively migrate with the tides (Forward and Tankersly 2001). Thus, in a tidally-influenced system, metric that measures the frequency and directionality of the velocity (proportion positive velocity) is

arguably more relevant for anadromous fish migration than a metric that measures the magnitude of the velocity (e.g., mean velocity).

The 15-minute observations were summarized for every combination of scenario (No Action Alternative, Second Basis of Comparison, Alternative 3, and Alternative 5) for 81 water years (1922 to 2003); DSM2 channels (21, 45, 94, 212, 421); and January through June to provide a total of 9,840 observations (4 * 82 * 5 * 6).

9K.1.2 Delta Hydrodynamic Analysis Scenario Assumptions

The key assumption in the Delta Hydrodynamic analysis is that the proportion positive velocity of a channel, measured at a monthly time step, is an indicator of the likelihood that juvenile anadromous fish will successfully migrate through that channel towards the ocean.

9K.2 Delta Hydrodynamic Analysis Results

IOS Model results are provided to compare the scenarios. Differences in escapement and egg survival are displayed as time histories across all 81 water years (1922 to 2002), and box plots of median survival across all years.

The results are provided as figures summarizing the proportion of positive velocities in each month at various locations over the 82-year CalSim II simulation period for following runs:

- No Action Alternative
- Second Basis of Comparison (same as Alternative 1)
- Alternative 3
- Alternative 5

The following scenario comparisons are presented in Figures 9K.1 through 9K.25:

- No Action Alternative compared to the Second Basis of Comparison
- Alternative 3 compared to the No Action Alternative
- Alternative 3 compared to the Second Basis of Comparison
- Alternative 5 compared to the No Action Alternative
- Alternative 5 compared to the Second Basis of Comparison

9K.3 Reference

Forward, Jr. R.B. & R.A. Tankersley. 2001. “Selective Tidal-stream Transport of Marine Animals.” *Oceanogr. Mar. Biol. Ann. Rev*. 39: 305-353.

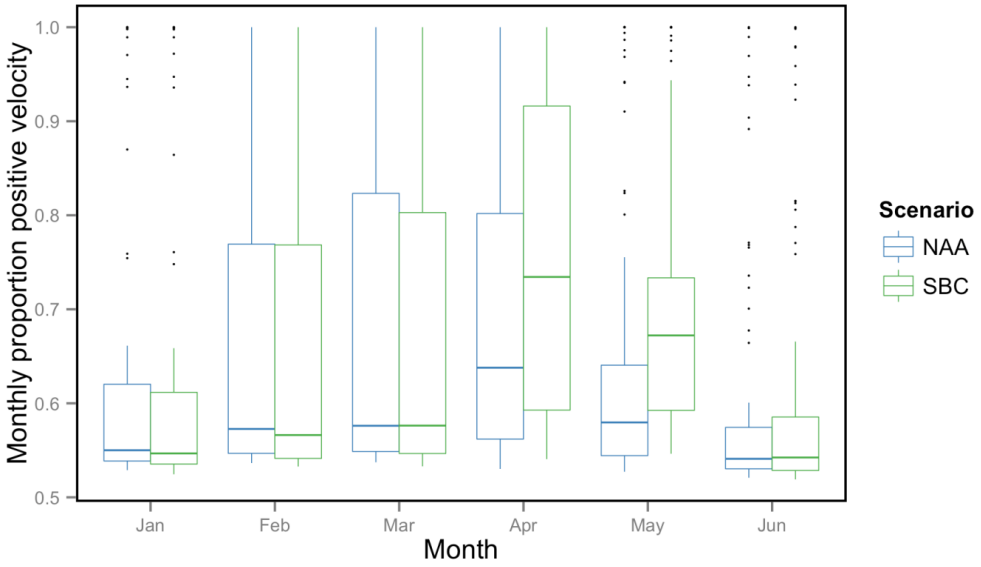

Figure 9K.1 Proportion of Monthly Positive Velocities in the San Joaquin River Downstream of the Head of Old River under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

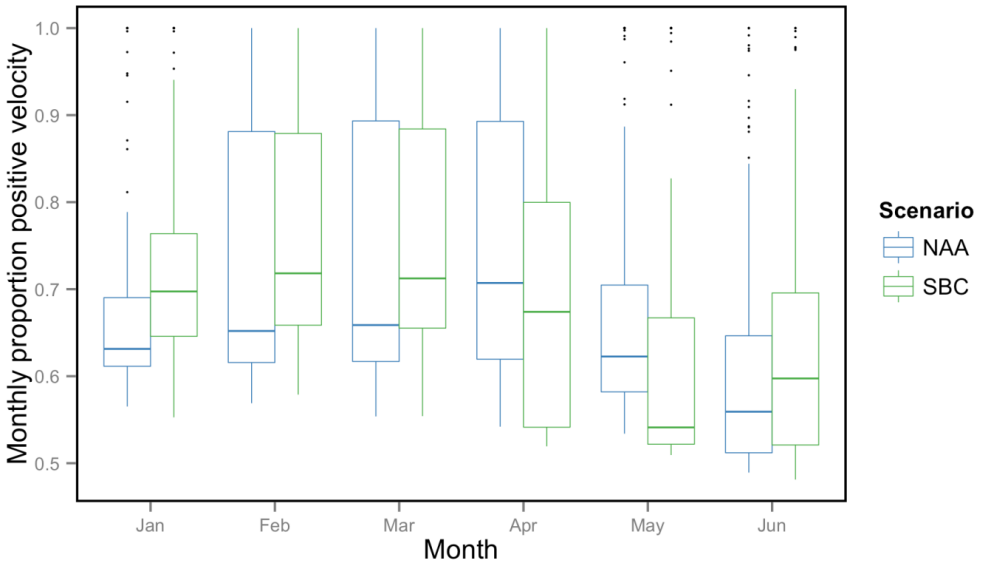

Figure 9K.2 Proportion of Monthly Positive Velocities in Old River Upstream of the Facilities under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

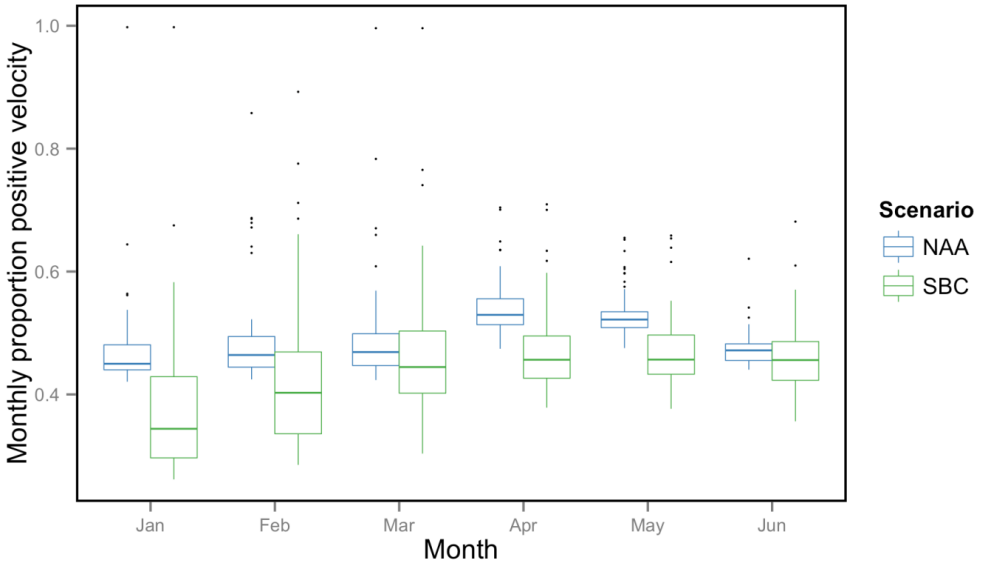

Figure 9K.3 Proportion of Monthly Positive Velocities in Old River Downstream of the Facilities under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

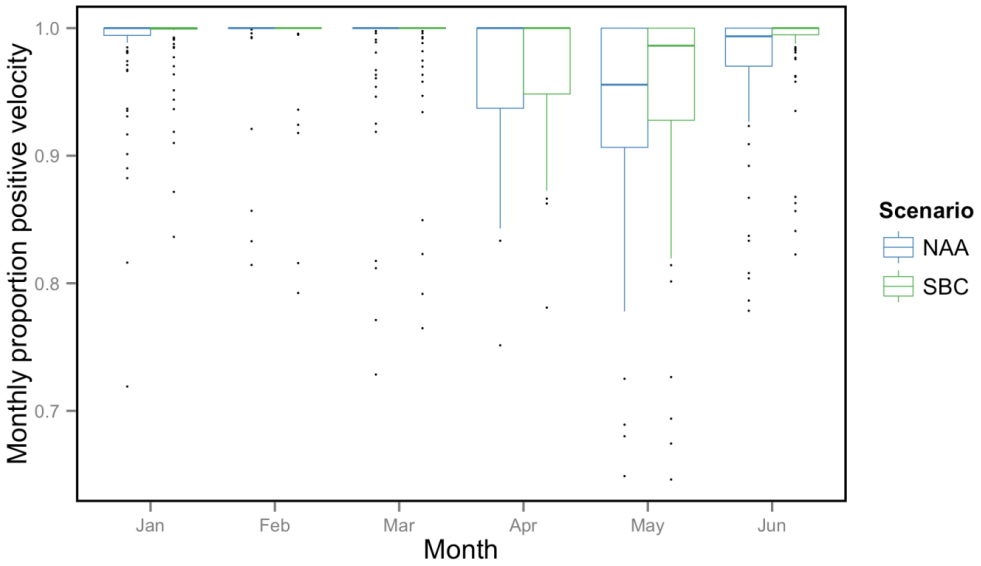

Figure 9K.4 Proportion of Monthly Positive Velocities in Sacramento River near Georgiana Slough under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

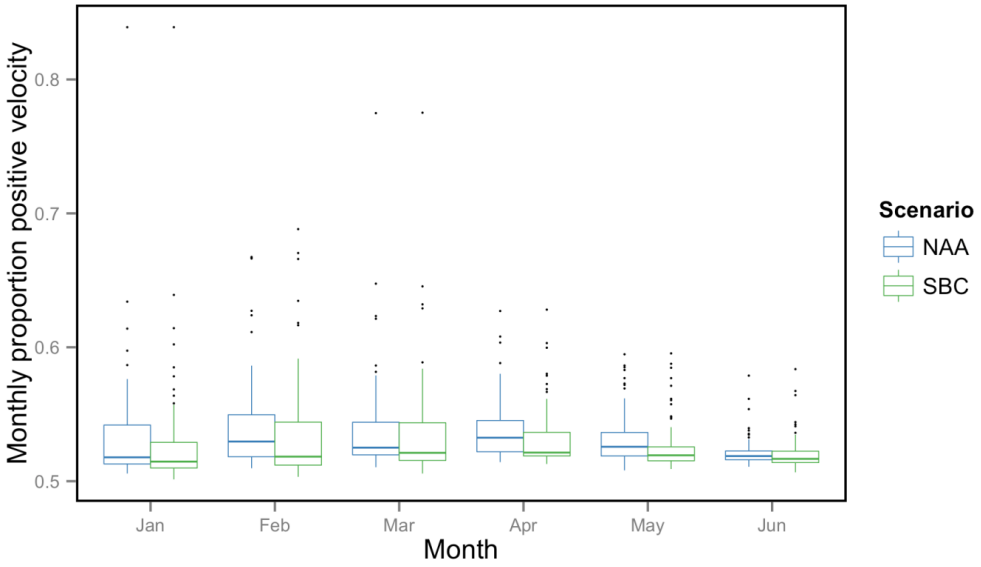

Figure 9K.5 Proportion of Monthly Positive Velocities in the San Joaquin River near Confluence with Mokelumne River under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

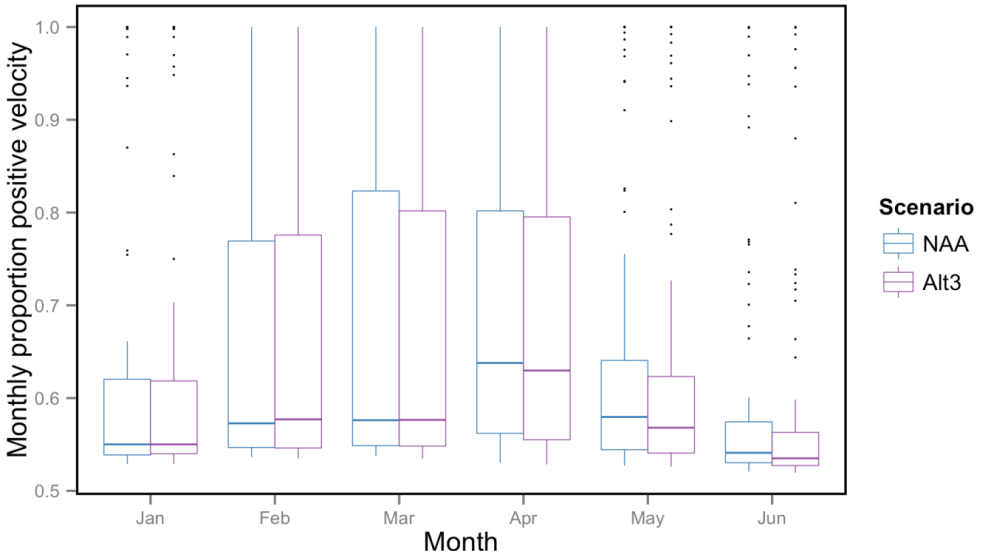

Figure 9K.6 Proportion of Monthly Positive Velocities in the San Joaquin River Downstream of the Head of Old River under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

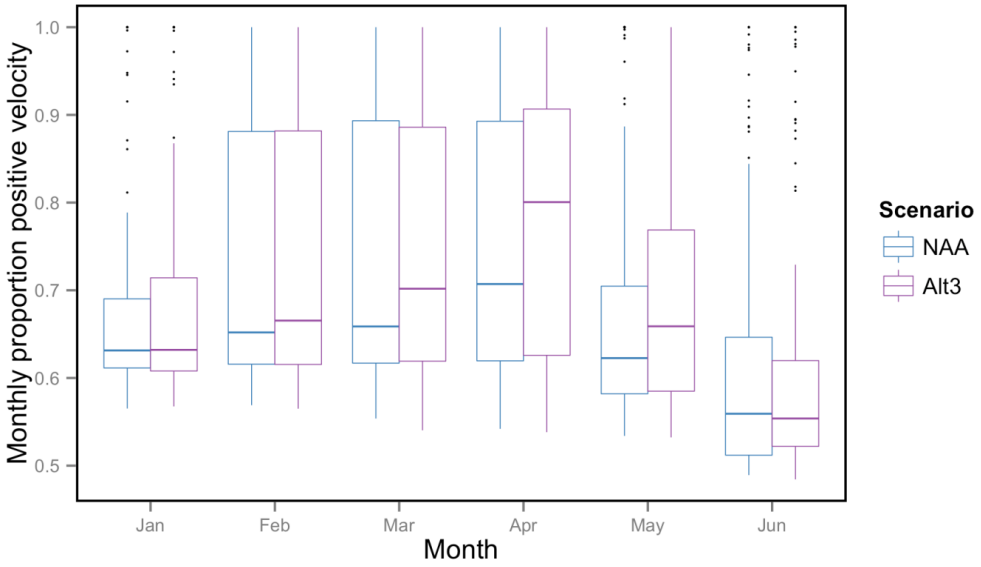

Figure 9K.7 Proportion of Monthly Positive Velocities in Old River Upstream of the Facilities under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

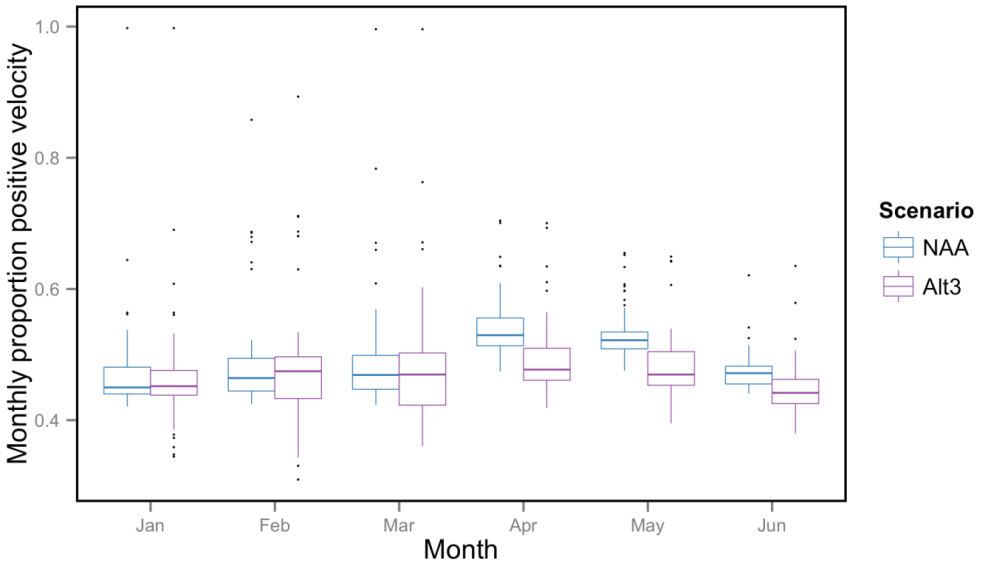

Figure 9K.8 Proportion of Monthly Positive Velocities in Old River Downstream of the Facilities under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

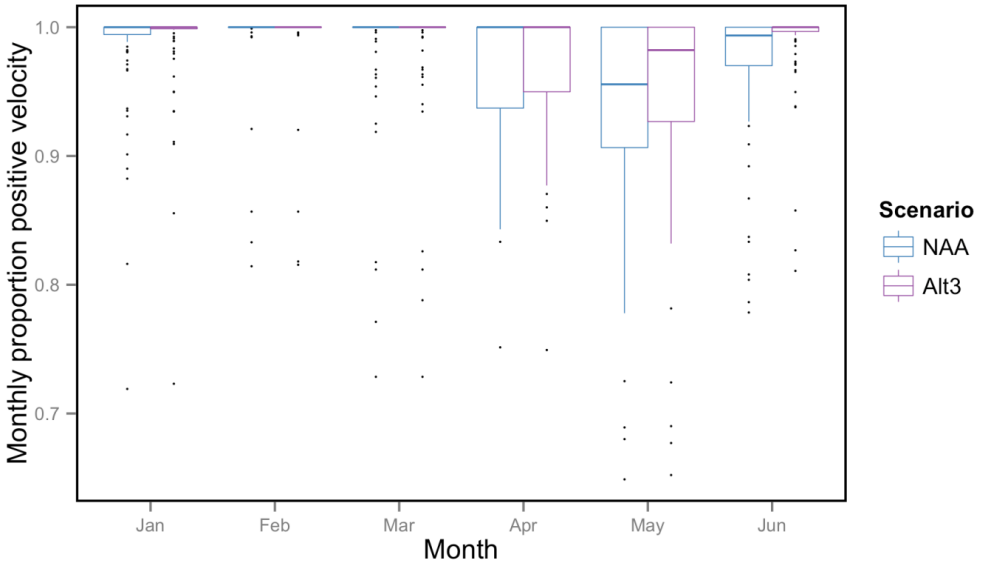

Figure 9K.9 Proportion of Monthly Positive Velocities in Sacramento River near Georgiana Slough under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

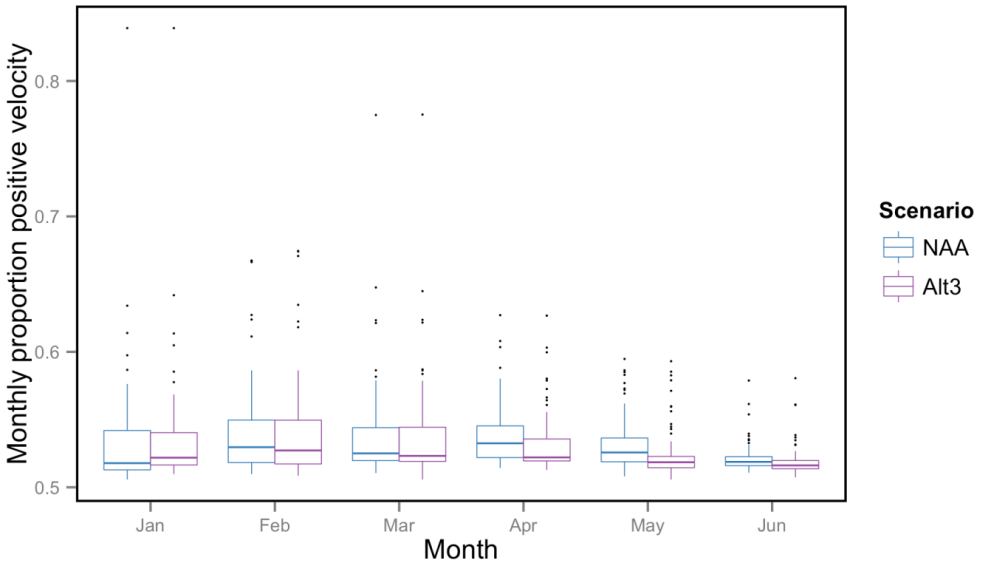

Figure 9K.10 Proportion of Monthly Positive Velocities in the San Joaquin River near Confluence with Mokelumne River under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

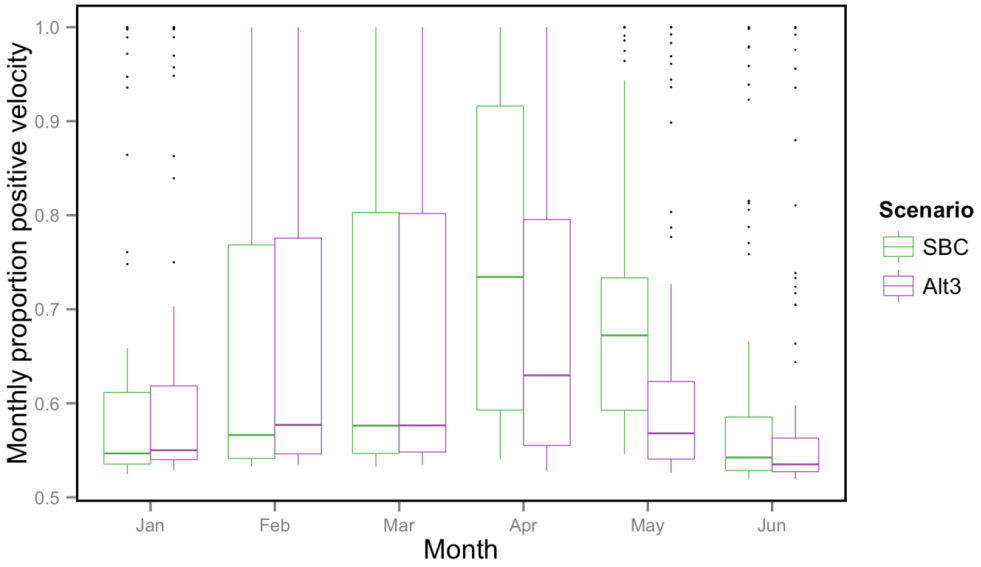

Figure 9K.11 Proportion of Monthly Positive Velocities in the San Joaquin River Downstream of the Head of Old River under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

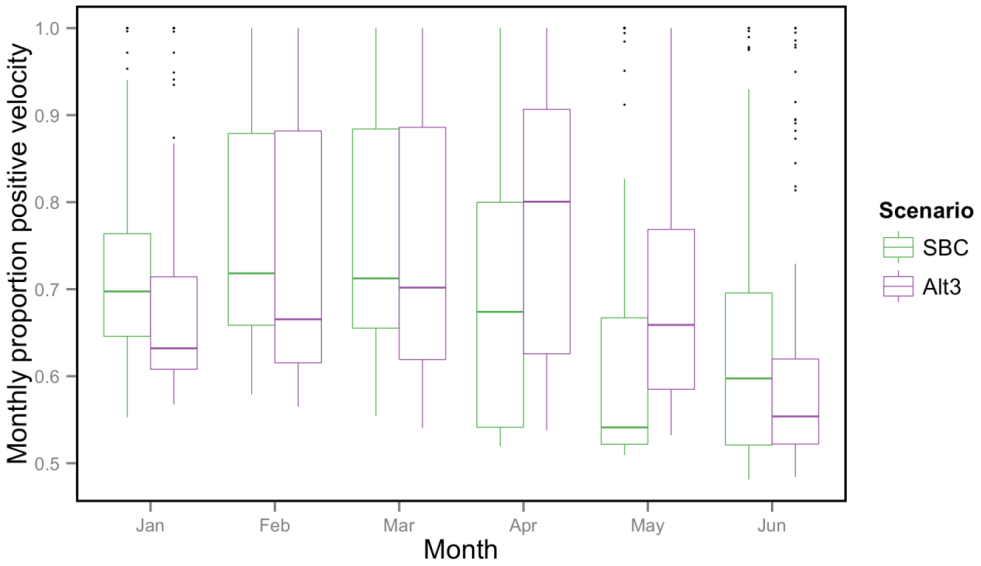

Figure 9K.12 Proportion of Monthly Positive Velocities in Old River Upstream of the Facilities under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

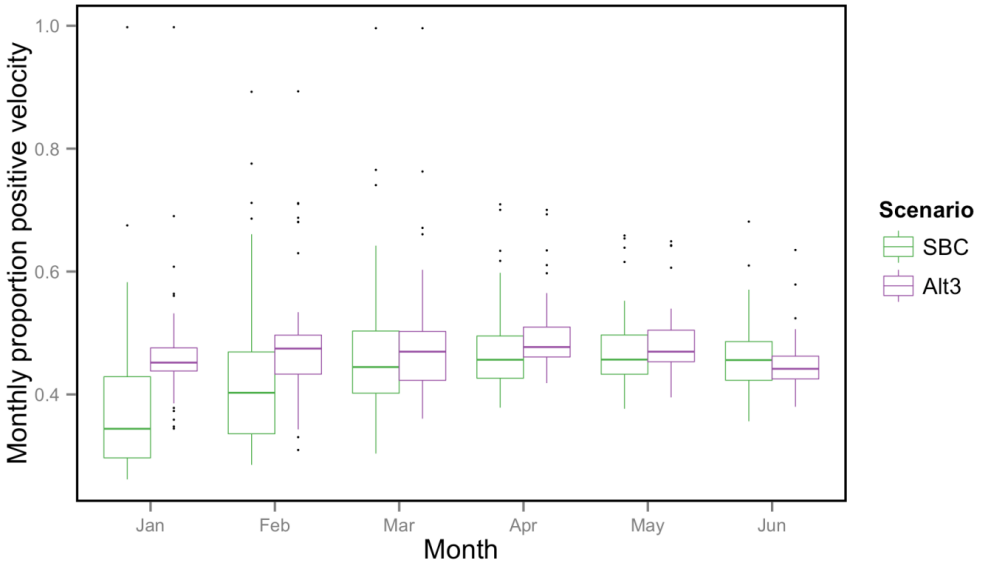

Figure 9K.13 Proportion of Monthly Positive Velocities in Old River Downstream of the Facilities under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

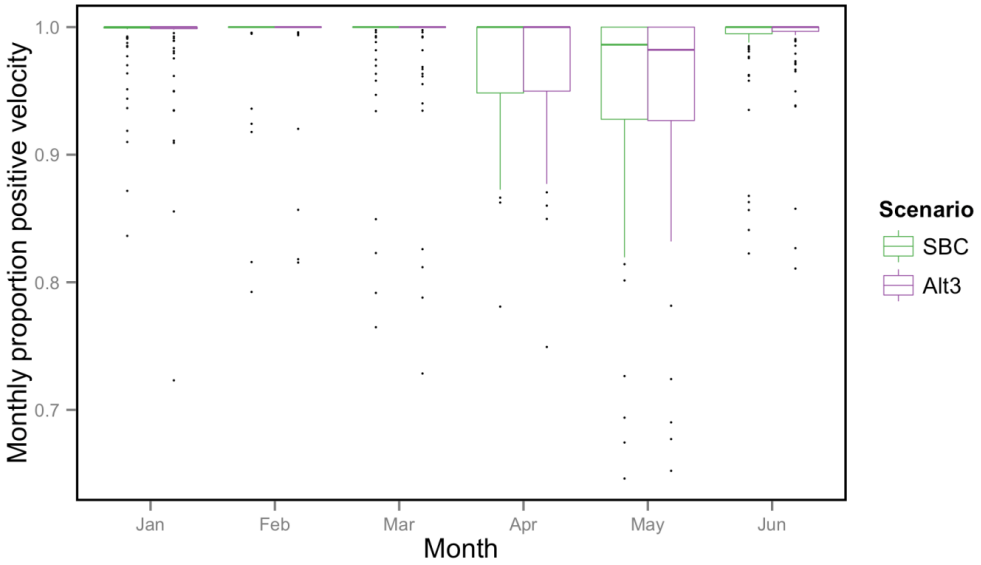

Figure 9K.14 Proportion of Monthly Positive Velocities in Sacramento River near Georgiana Slough under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

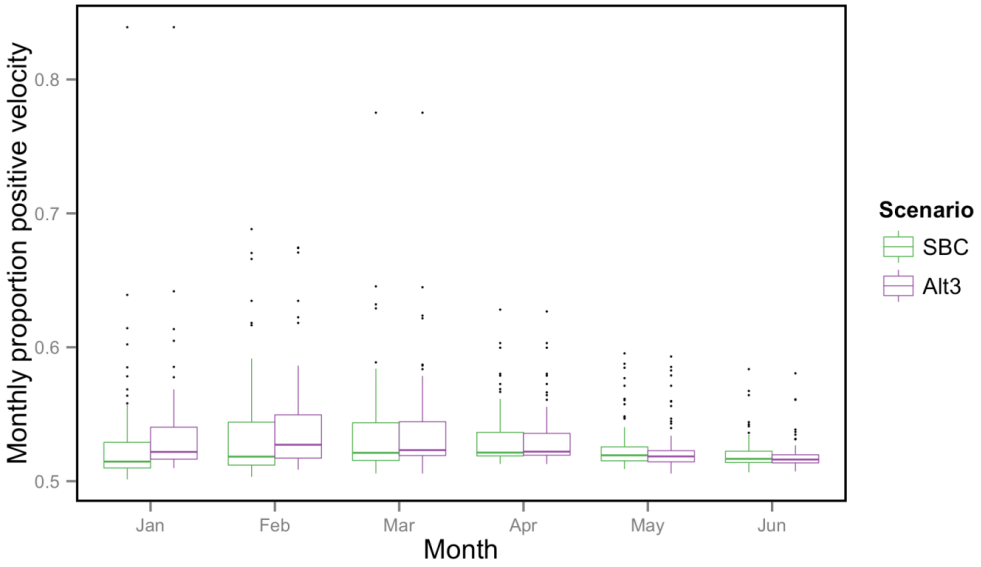

Figure 9K.15 Proportion of Monthly Positive Velocities in the San Joaquin River near Confluence with Mokelumne River under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison

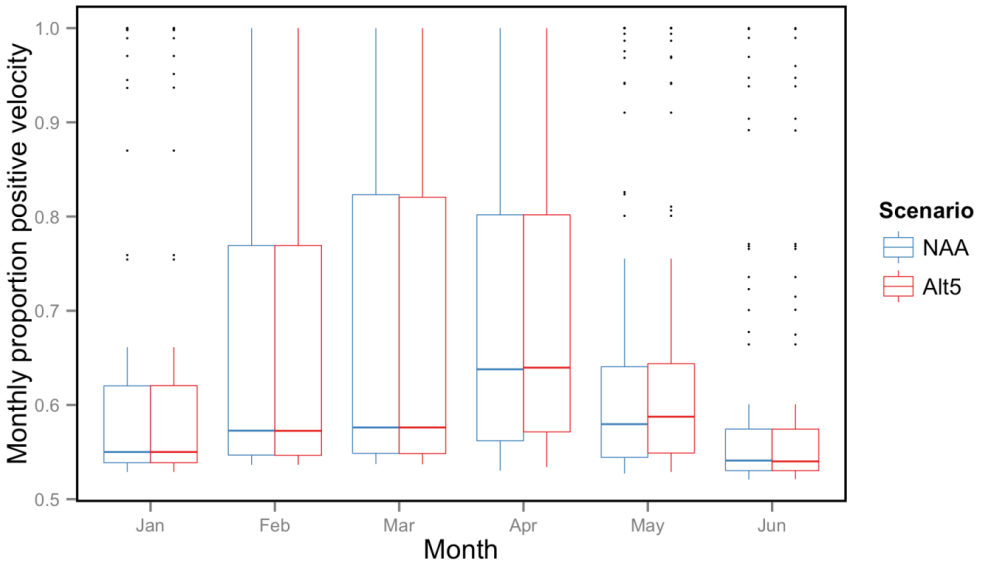

Figure 9K.16 Proportion of Monthly Positive Velocities in the San Joaquin River Downstream of the Head of Old River under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

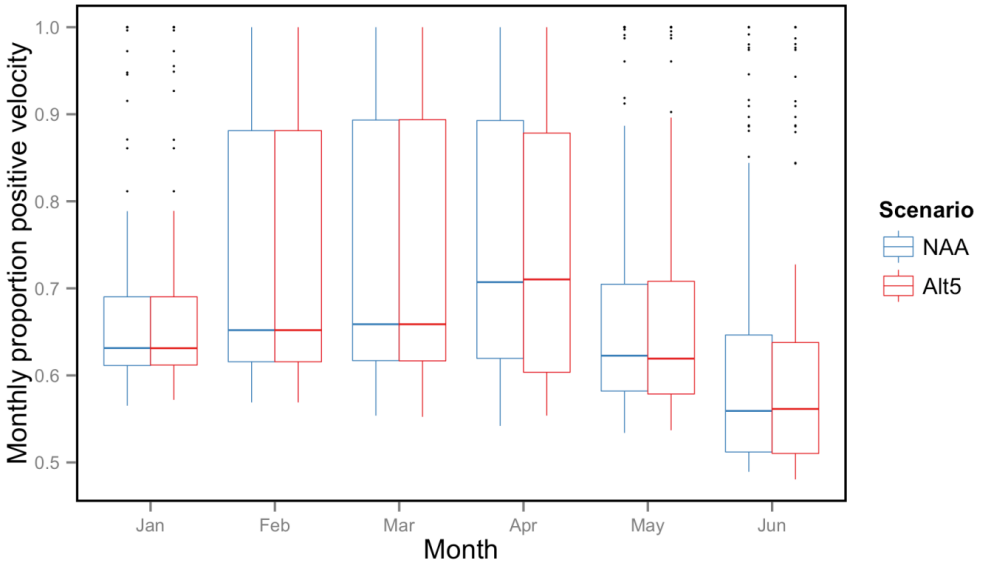

Figure 9K.17 Proportion of Monthly Positive Velocities in Old River Upstream of the Facilities under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

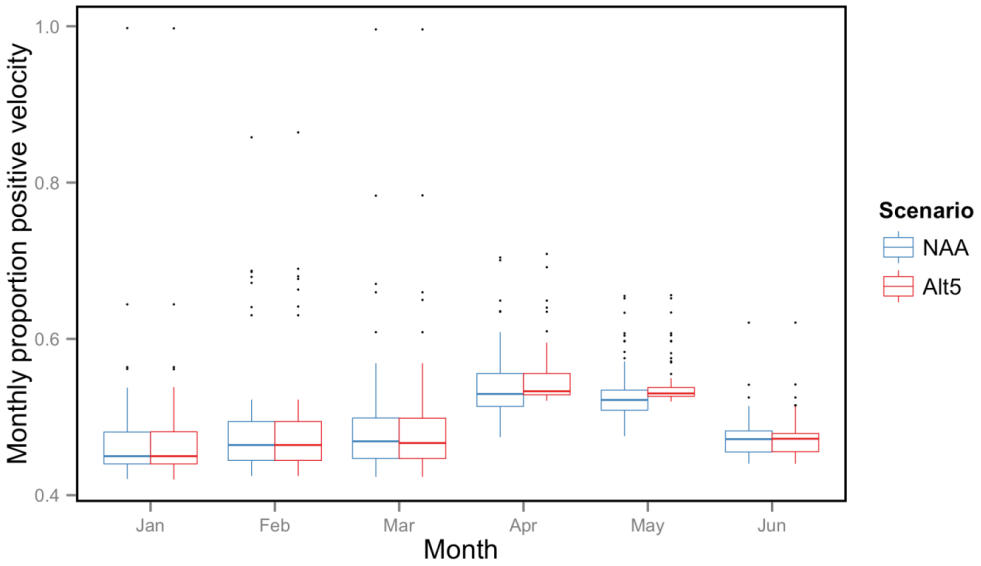

Figure 9K.18 Proportion of Monthly Positive Velocities in Old River Downstream of the Facilities under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

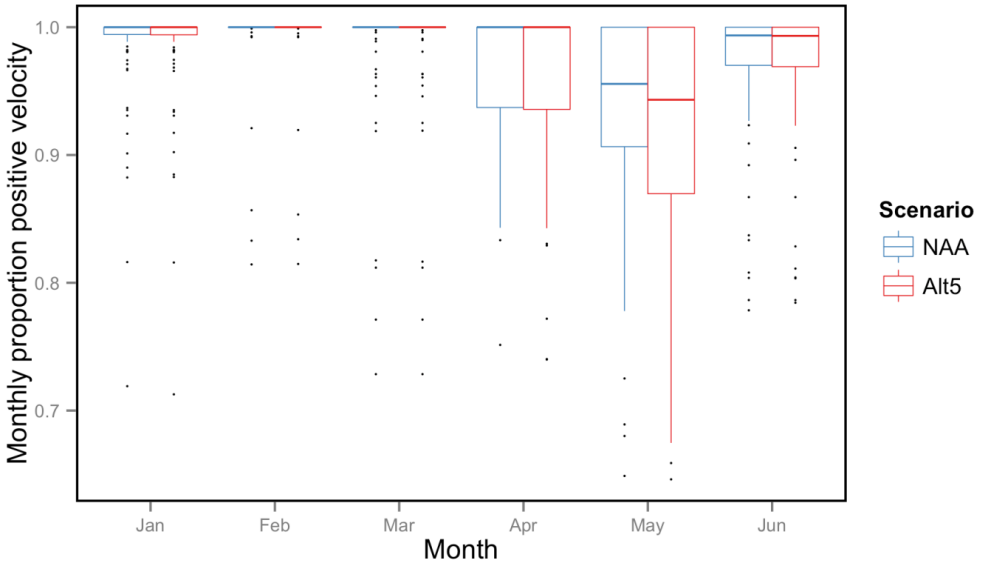

Figure 9K.19 Proportion of Monthly Positive Velocities in Sacramento River near Georgiana Slough under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

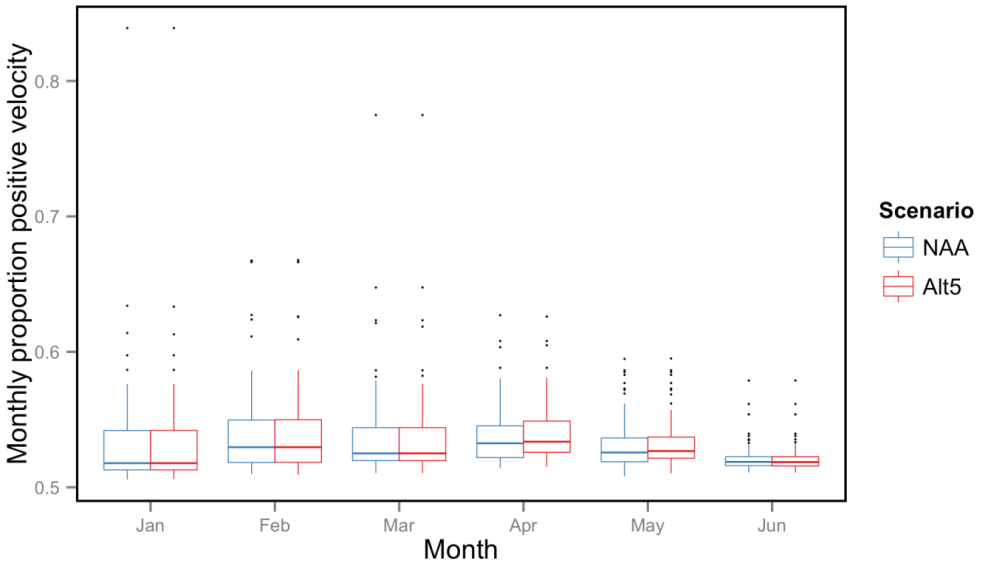

Figure 9K.20 Proportion of Monthly Positive Velocities in the San Joaquin River near Confluence with Mokelumne River under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

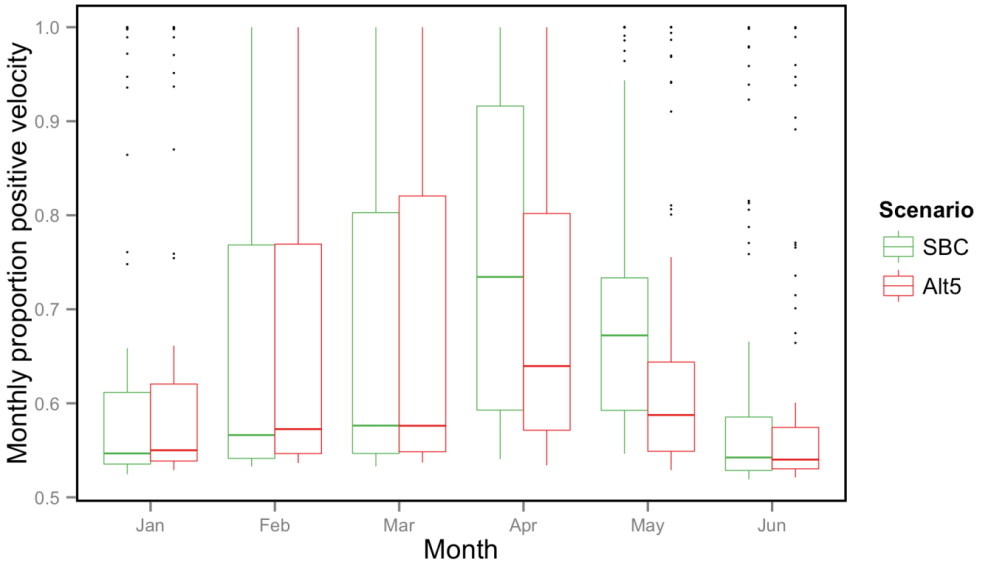

Figure 9K.21 Proportion of Monthly Positive Velocities in the San Joaquin River Downstream of the Head of Old River under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

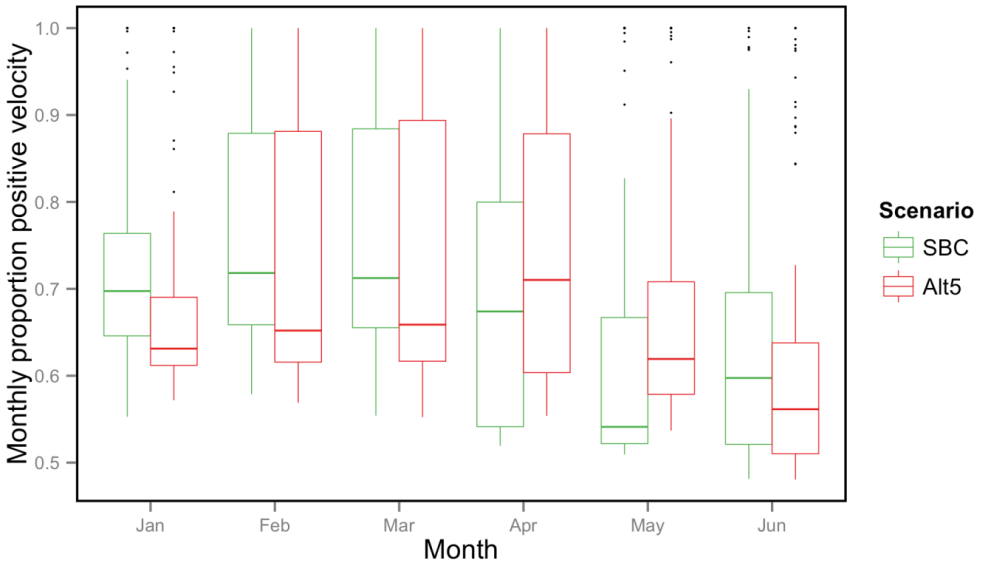

Figure 9K.22 Proportion of Monthly Positive Velocities in Old River Upstream of the Facilities under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

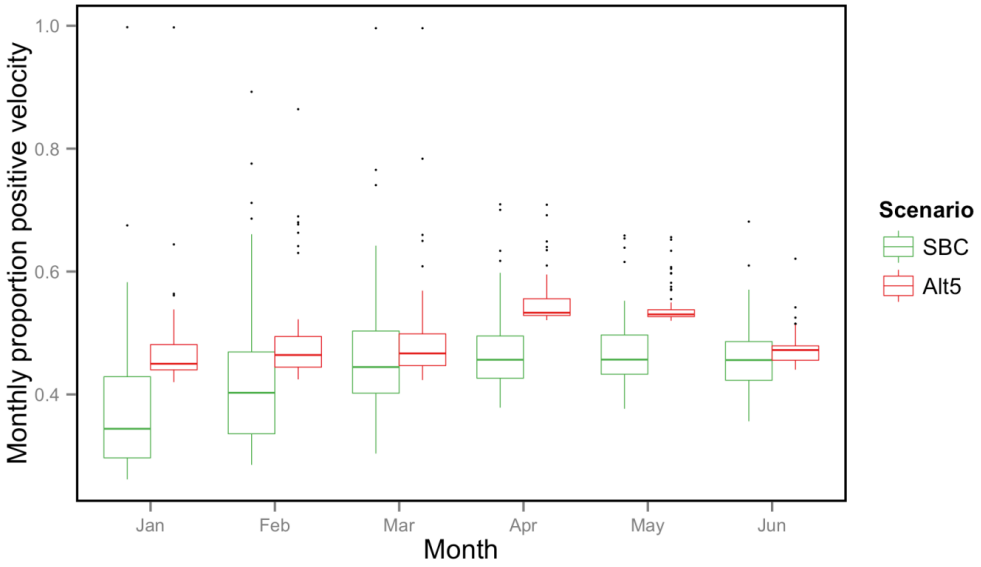

Figure 9K.23 Proportion of Monthly Positive Velocities in Old River Downstream of the Facilities under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

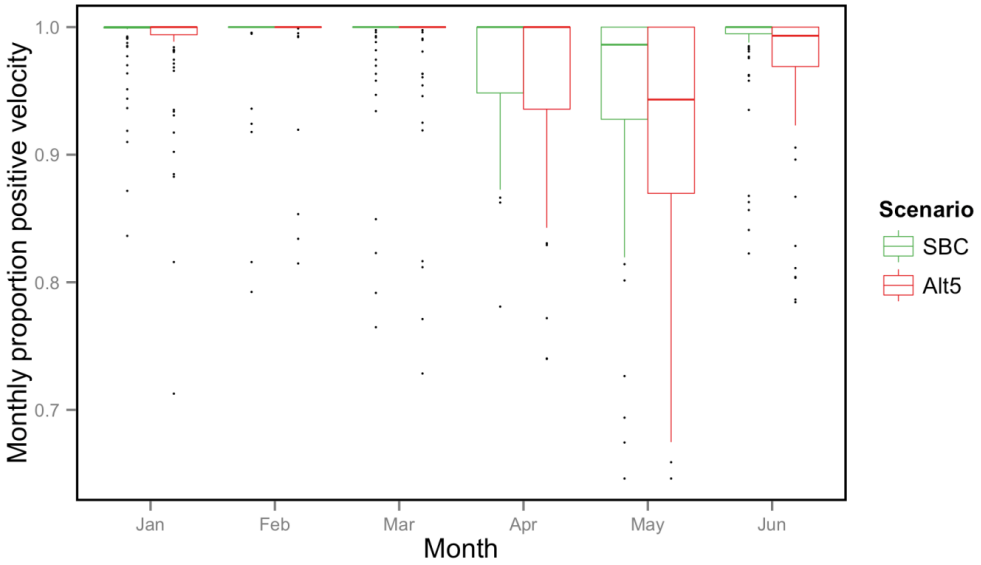

Figure 9K.24 Proportion of Monthly Positive Velocities in Sacramento River near Georgiana Slough under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

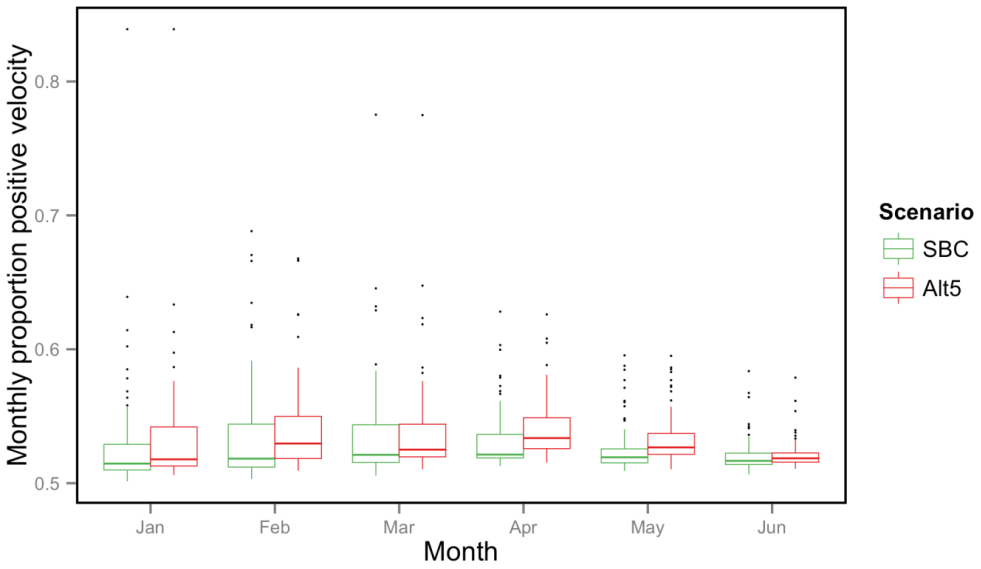

Figure 9K.25 Proportion of Monthly Positive Velocities in the San Joaquin River near Confluence with Mokelumne River under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

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Appendix 9L

Junction Entrainment Analysis Documentation

This appendix provides information about the junction entrainment analysis methods and assumptions used for the Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS) analysis. This appendix is organized in two main sections:

- Section 9L.1: Methodology and Assumptions
  - The junction entrainment analysis uses the statistical relationship published in Cavallo et al. (2015) to predict the fish routing based on the proportion of flow moving through channel junctions in the Delta. This section briefly describes the approach and assumptions of the junction entrainment analysis.
- Section 9L.2: Results
  - This section presents the junction entrainment analysis results. Results are presented in a series of figures showing the probability of fish entrainment at various junctions in the Delta.

9L.1 Methodology and Assumptions

9L.1.1 Methodology

In this analysis, predicted entrainment into a distributary was based on 15-minute flow output from DSM2 over the 82-year simulation period following the statistical relationship reported in Cavallo et al. (2015). In that analysis, the proportion of acoustically tagged juvenile Chinook Salmon entrained in a distributary at seven junctions in the Delta was regressed against the proportion of flow into the distributary. The releases of tagged juvenile Chinook Salmon included fall- and late-fall-run fish.

The probability of fish entrainment was predicted at five Delta junctions: Georgiana Slough, Head of Old River, Turner Cut, Columbia Cut, and Middle River. Using the proportion of flow entering the distributary for every 15-minute observation in the 82-year simulation period, the mean daily proportion of flow into the distributary was calculated. The mean daily flow proportion was then used to calculate the predicted daily probability of fish entrainment.

9L.1.2 Scenario Assumptions

The junction entrainment analysis includes the following assumptions.

- The entrainment analysis is applicable to spring- and winter-run Chinook Salmon even though only fall- and late-fall-run Chinook Salmon were used to construct the statistical model.
- Hatchery fish used in the tagging studies behave similarly to natural-origin fish when migrating through channel junctions.
- The proportion of flow into a distributary could not exceed one.
- When flow was entering a junction from the distributary, the proportion of flow into the distributary was set to zero.

9L.2 Results

The following scenario comparisons are presented in Figures 9L.1 through 9L.30, comparing the probability of fish entrainment at various junctions:

- No Action Alternative compared to the Second Basis of Comparison
- Alternative 3 compared to the No Action Alternative
- Alternative 3 compared to the Second Basis of Comparison
- Alternative 5 compared to the No Action Alternative
- Alternative 5 compared to the Second Basis of Comparison

9L.3 Reference

Cavallo, B., P. Gaskill, J. Melgo, and S.C. Zeug. 2015. “Predicting juvenile Chinook Salmon routing in riverine and tidal channels of a freshwater estuary” 98:1571-1582.

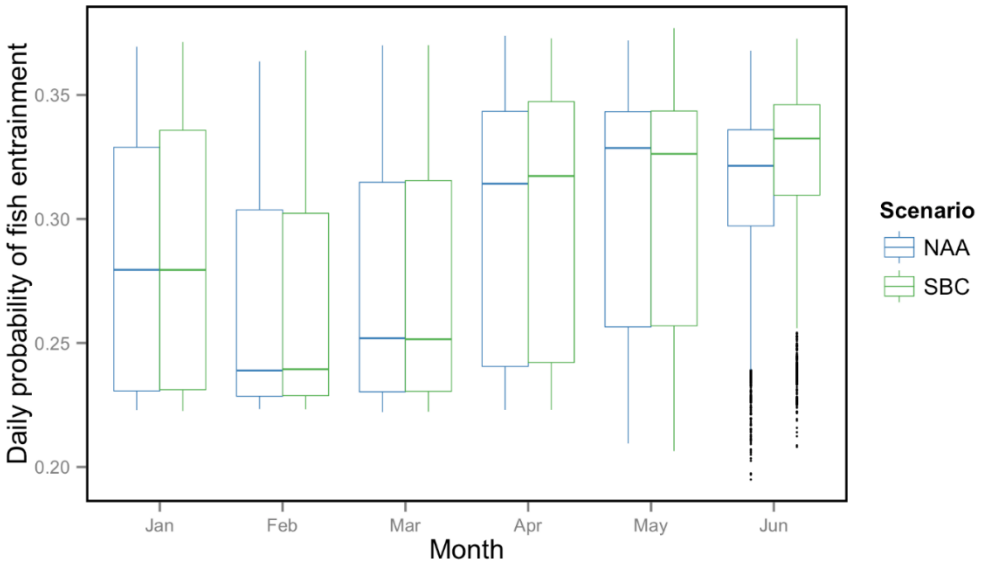

Figure 9L.1 Probability of Fish Entrainment into Georgiana Slough under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

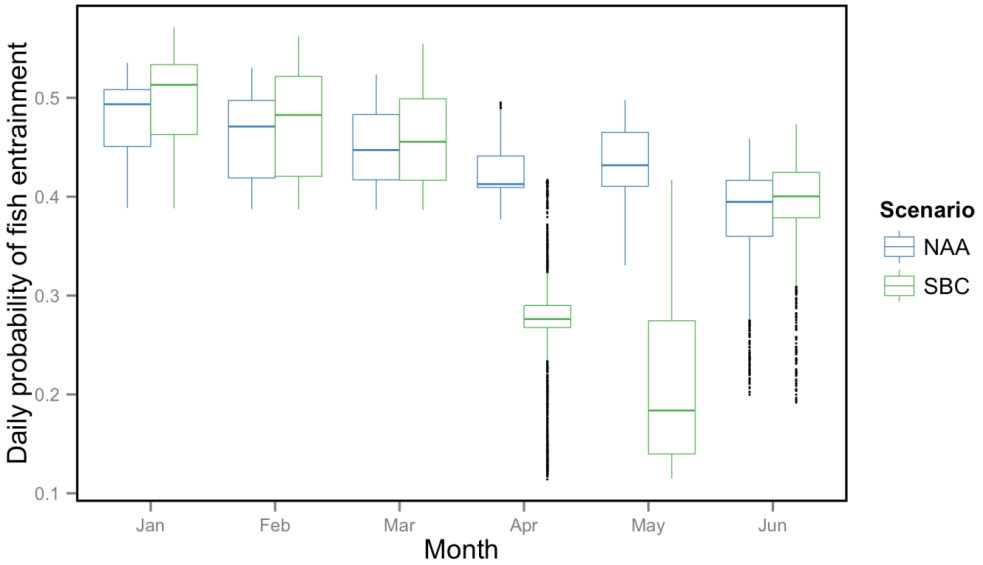

Figure 9L.2 Probability of Fish Entrainment into Head of Old River under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

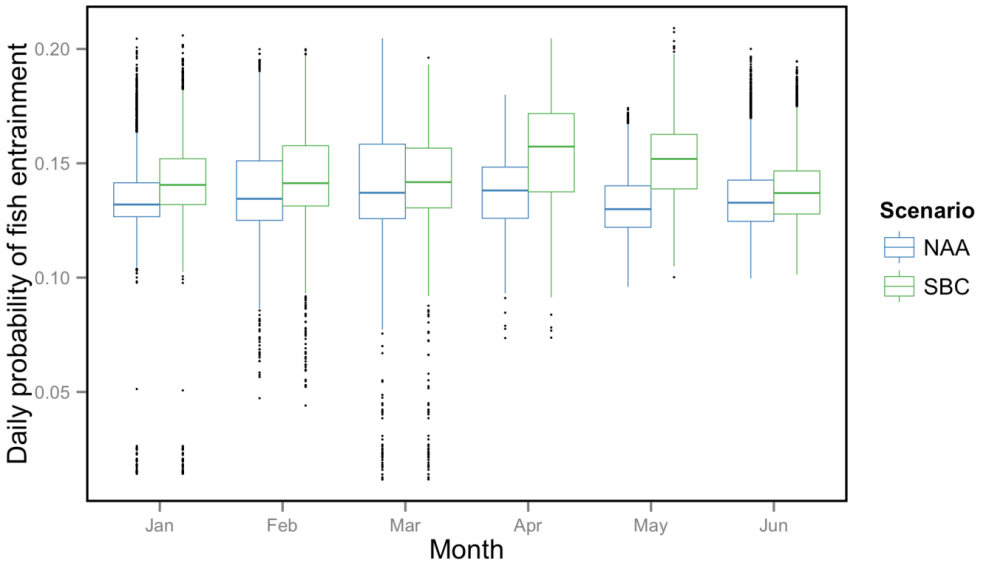

Figure 9L.3 Probability of Fish Entrainment into Turner Cut under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

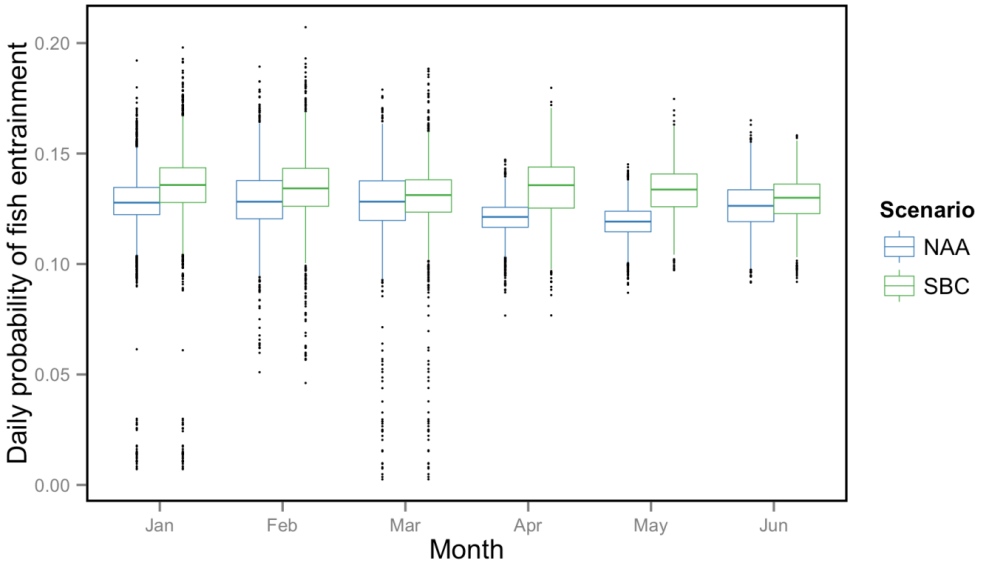

Figure 9L.4 Probability of Fish Entrainment into Columbia Cut under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

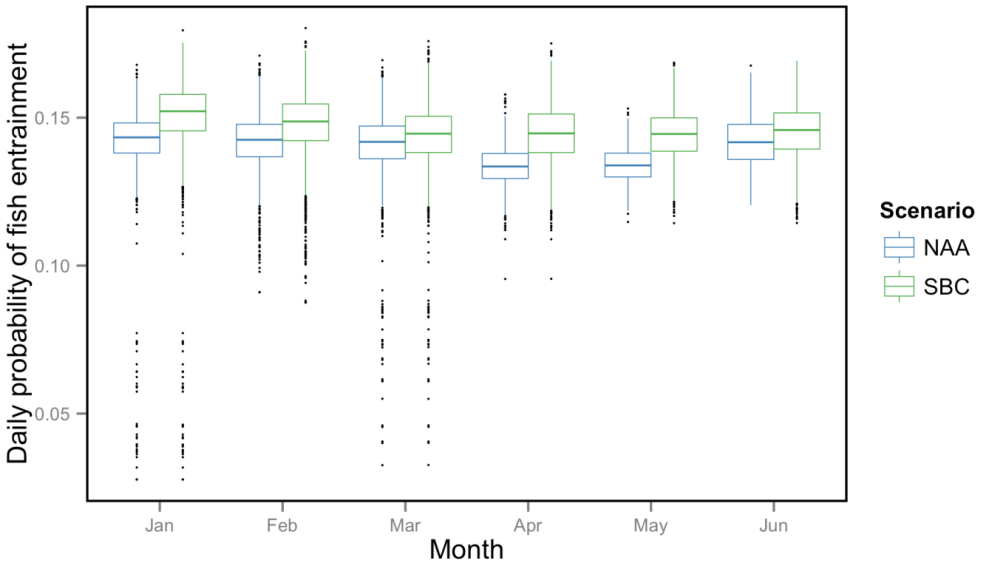

Figure 9L.5 Probability of Fish Entrainment into Middle River under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

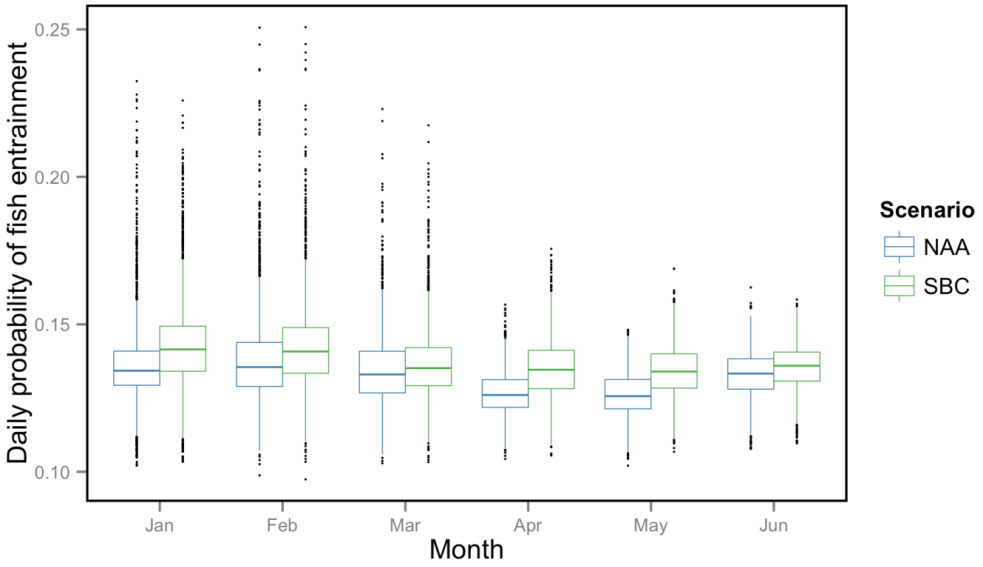

Figure 9L.6 Probability of Fish Entrainment into Old River under the No Action Alternative (NAA) compared to the Second Basis of Comparison (SBC)

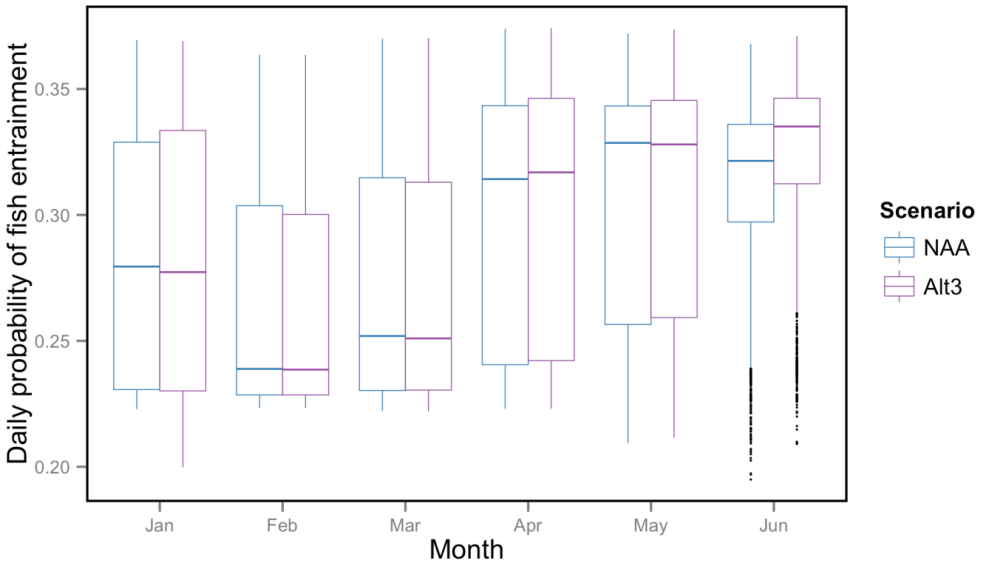

Figure 9L.7 Probability of Fish Entrainment into Georgiana Slough under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

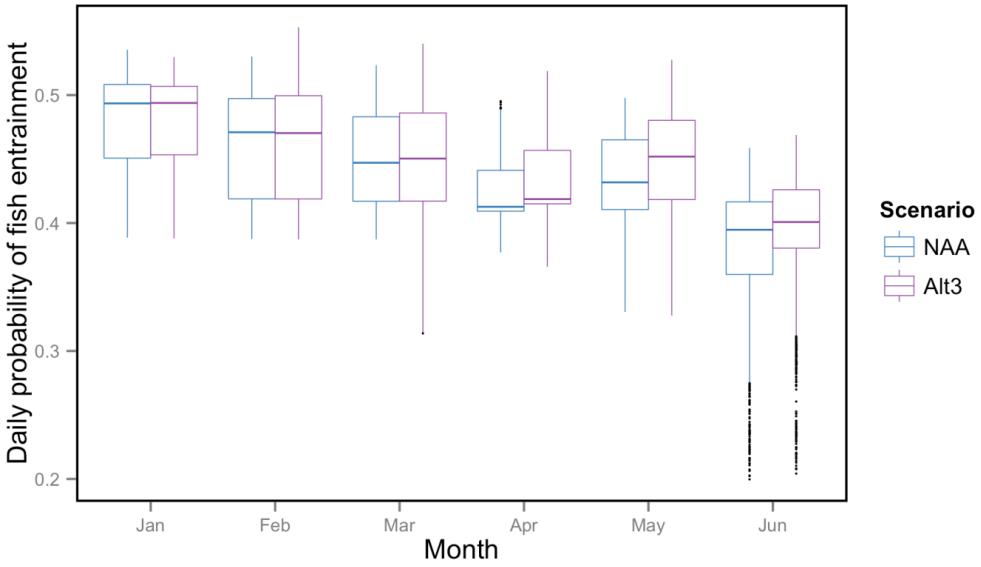

Figure 9L.8 Probability of Fish Entrainment into Head of Old River under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

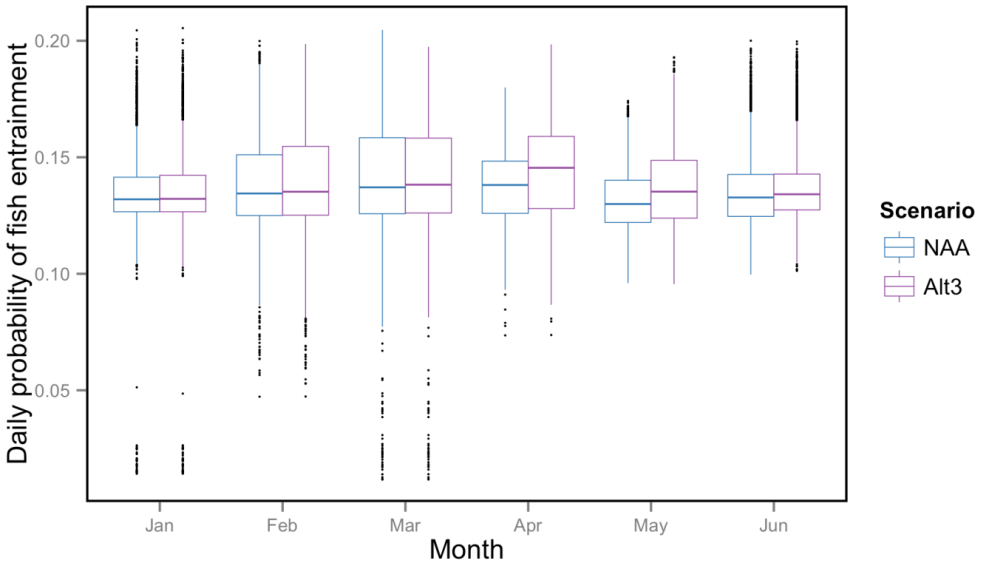

Figure 9L.9 Probability of Fish Entrainment into Turner Cut under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

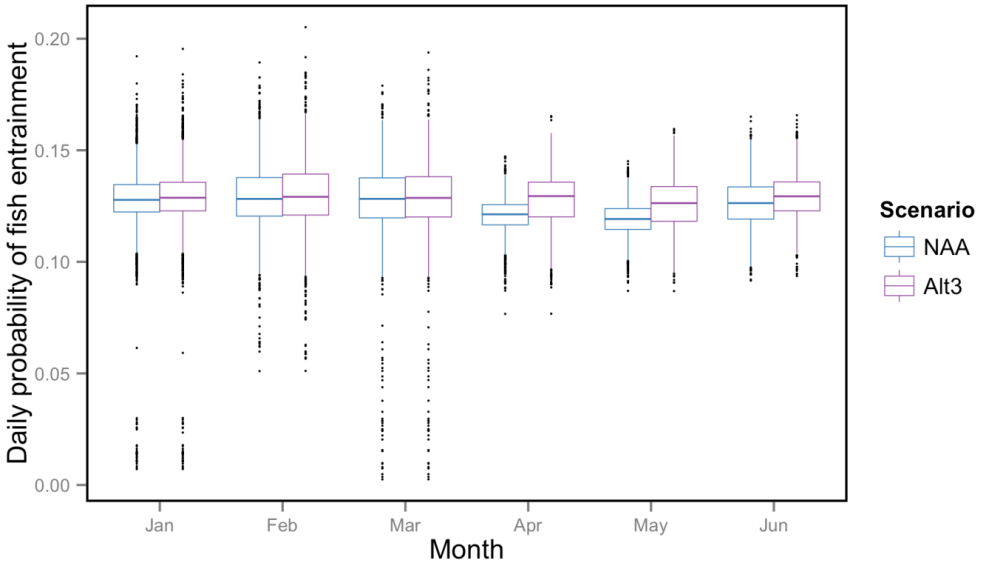

Figure 9L.10 Probability of Fish Entrainment into Columbia Cut under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

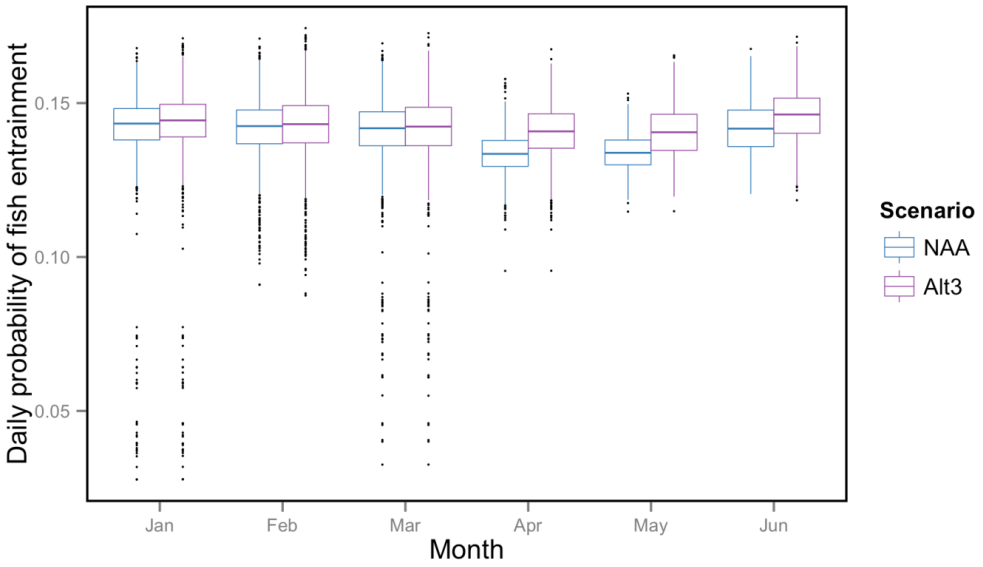

Figure 9L.11 Probability of Fish Entrainment into Middle River under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

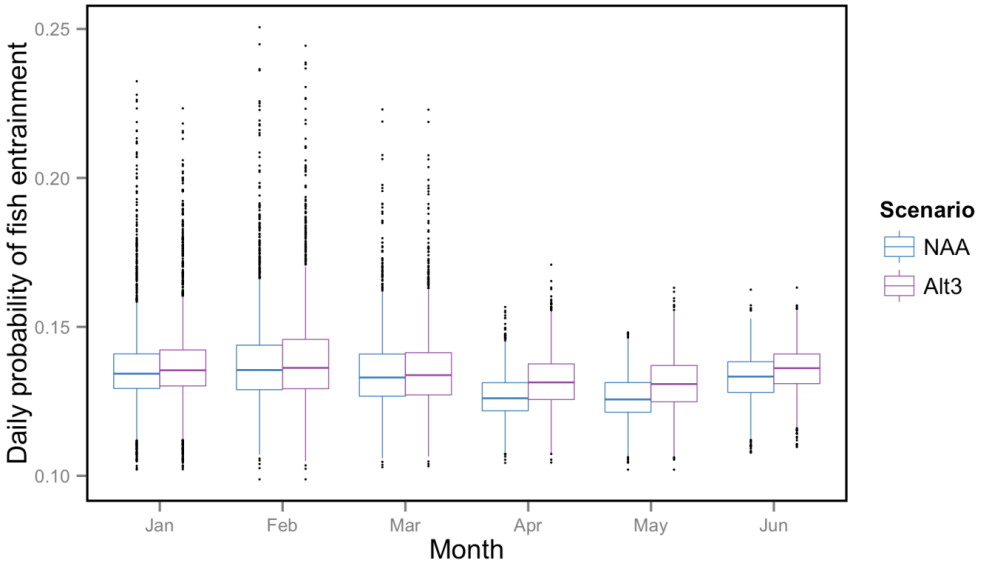

Figure 9L.12 Probability of Fish Entrainment into Old River under Alternative 3 (Alt 3) as compared to the No Action Alternative (NAA)

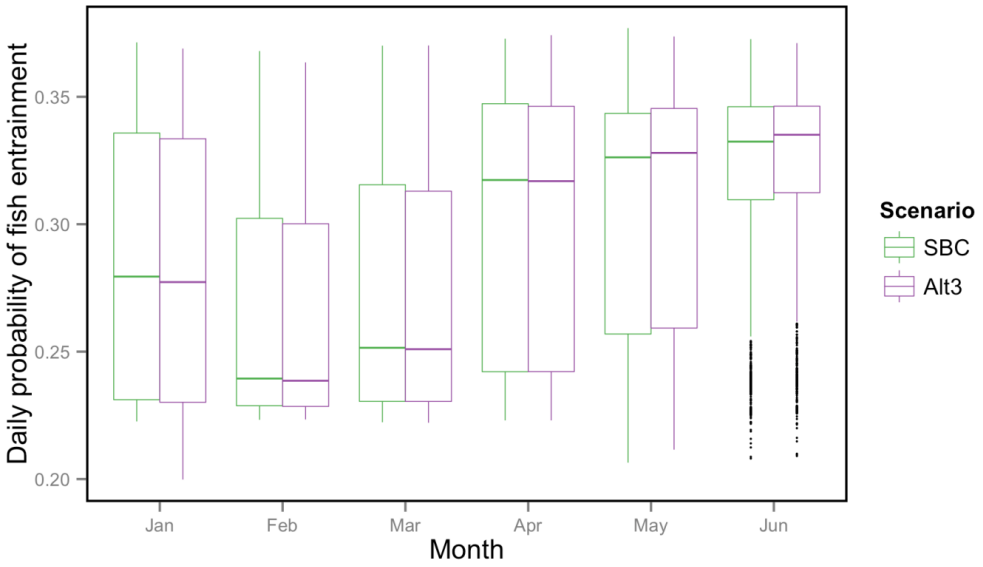

Figure 9L.13 Probability of Fish Entrainment into Georgiana Slough under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

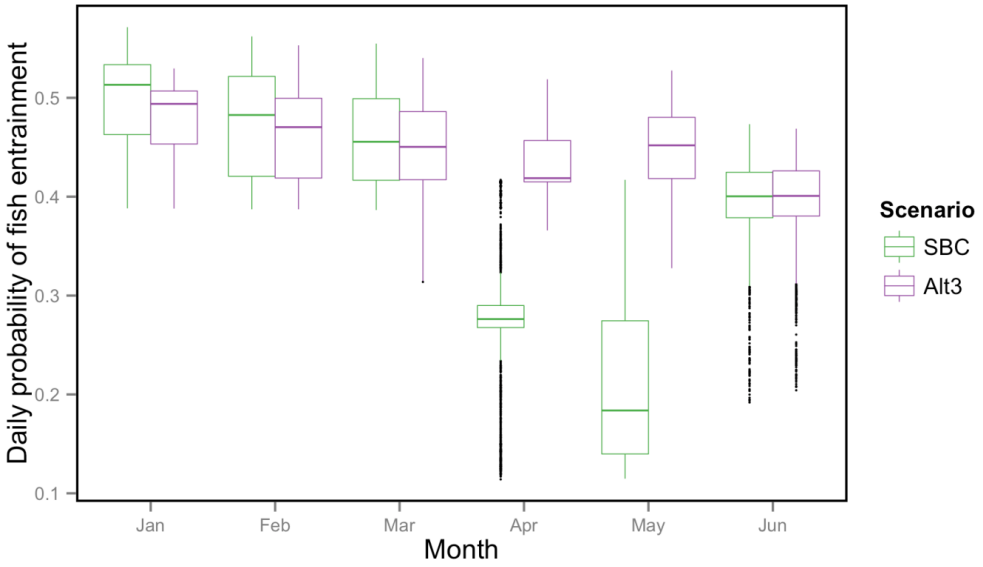

Figure 9L.14 Probability of Fish Entrainment into Head of Old River under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

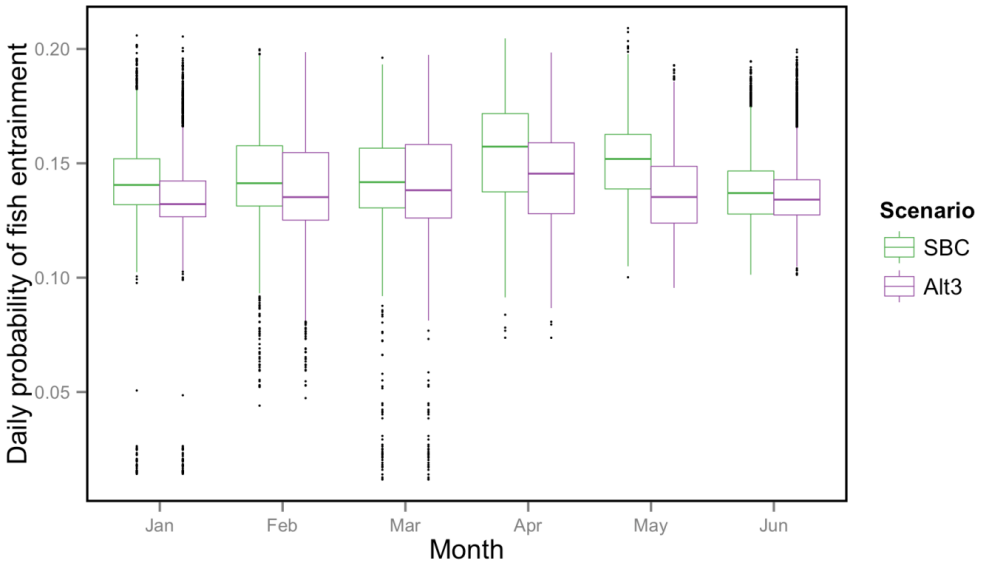

Figure 9L.15 Probability of Fish Entrainment into Turner Cut under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

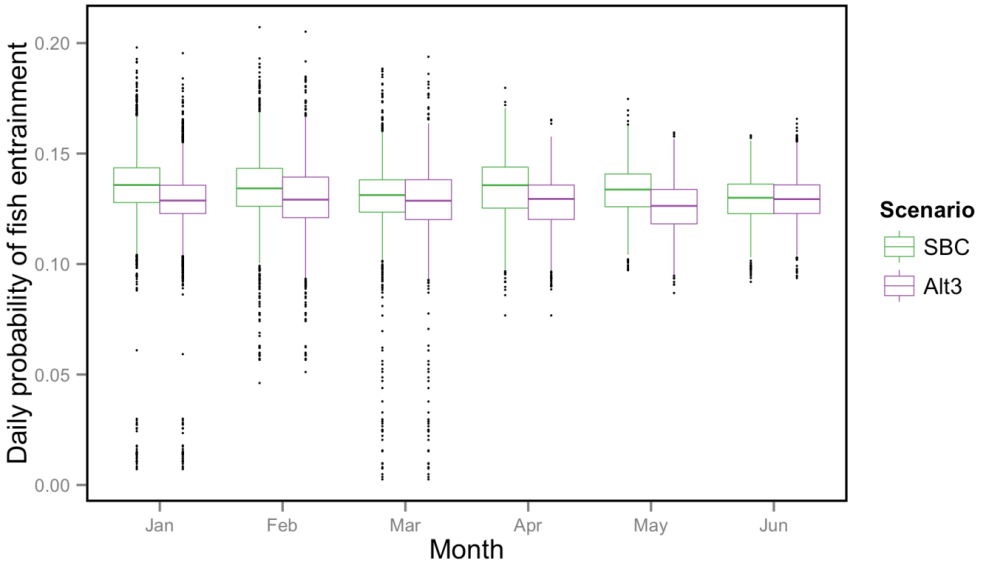

Figure 9L.16 Probability of Fish Entrainment into Columbia Cut under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

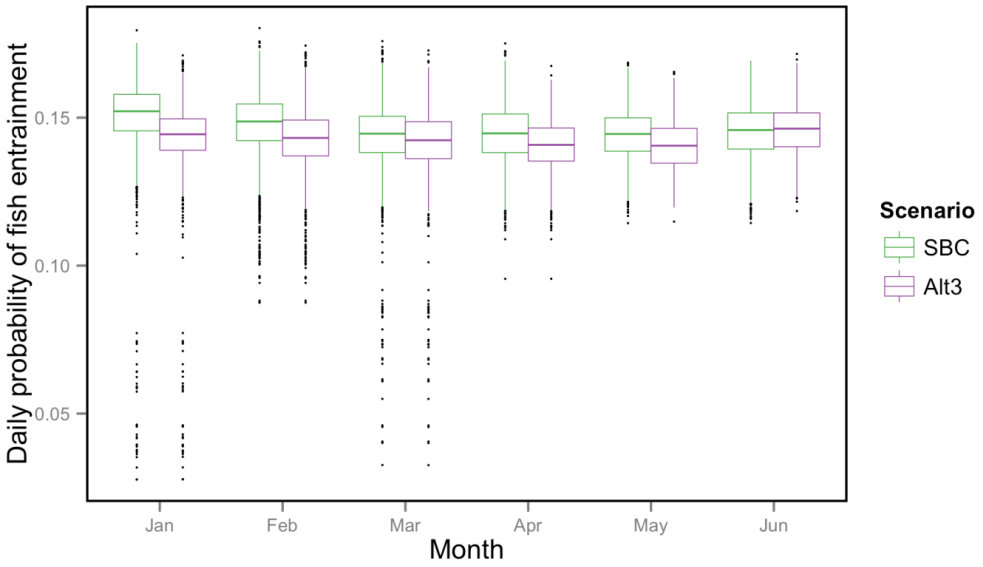

Figure 9L.17 Probability of Fish Entrainment into Middle River under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

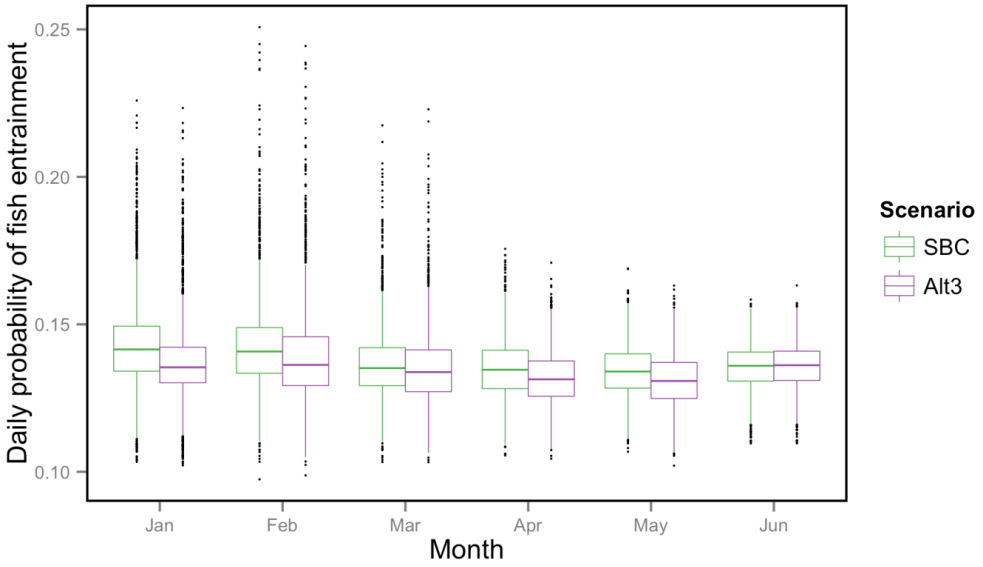

Figure 9L.18 Probability of Fish Entrainment into Old River under Alternative 3 (Alt 3) as compared to the Second Basis of Comparison (SBC)

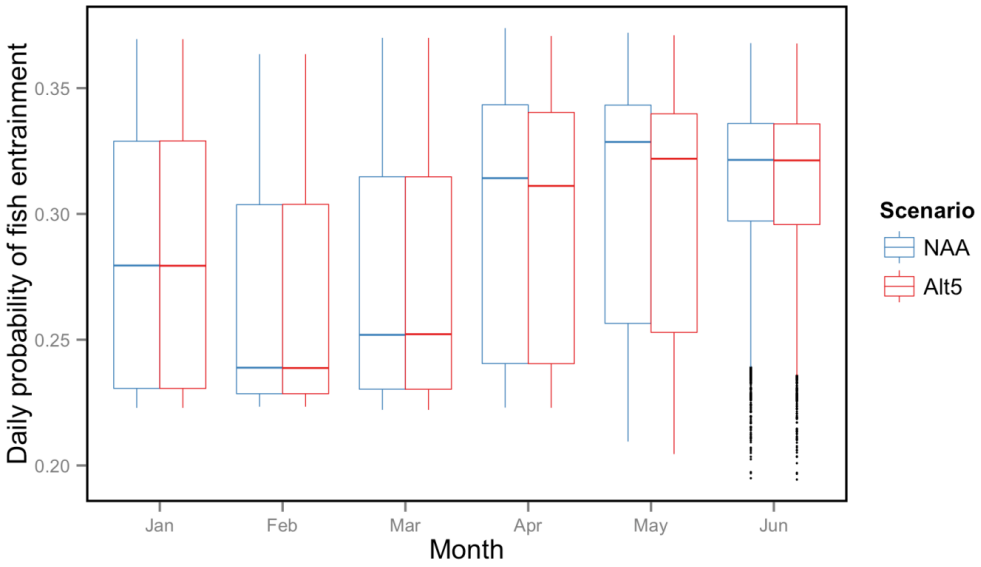

Figure 9L.19 Probability of Fish Entrainment into Georgiana Slough under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

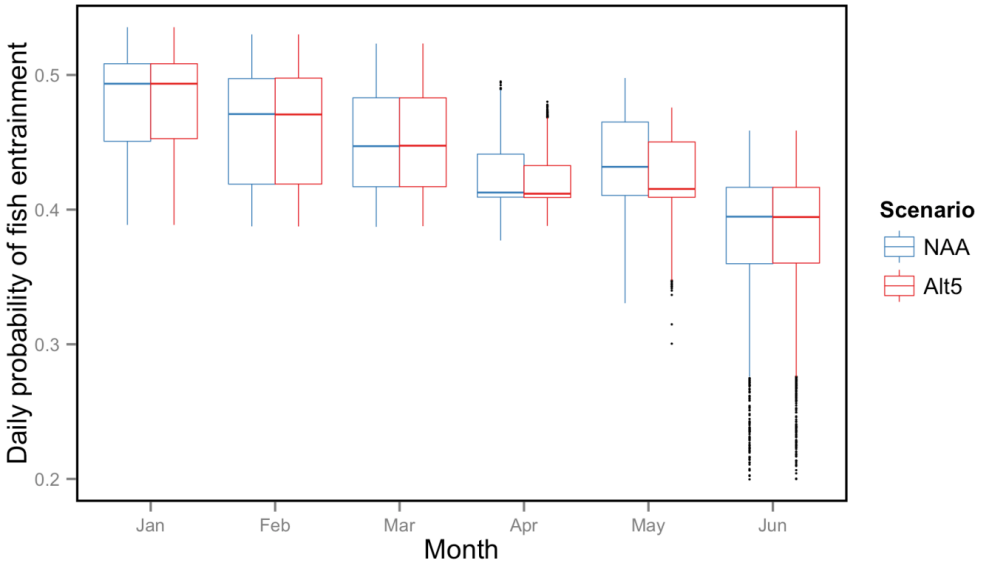

Figure 9L.20 Probability of Fish Entrainment into Head of Old River under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

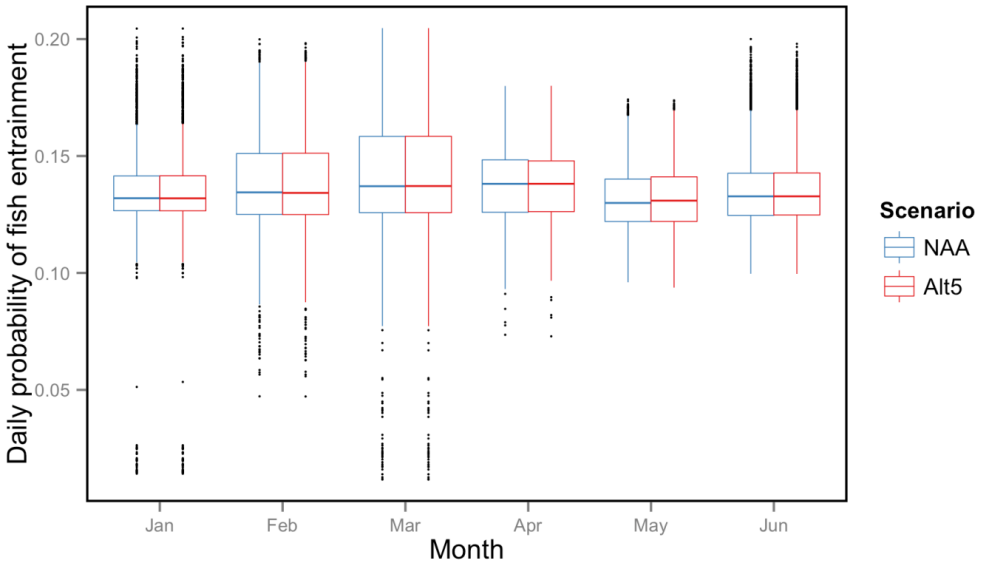

Figure 9L.21 Probability of Fish Entrainment into Turner Cut under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

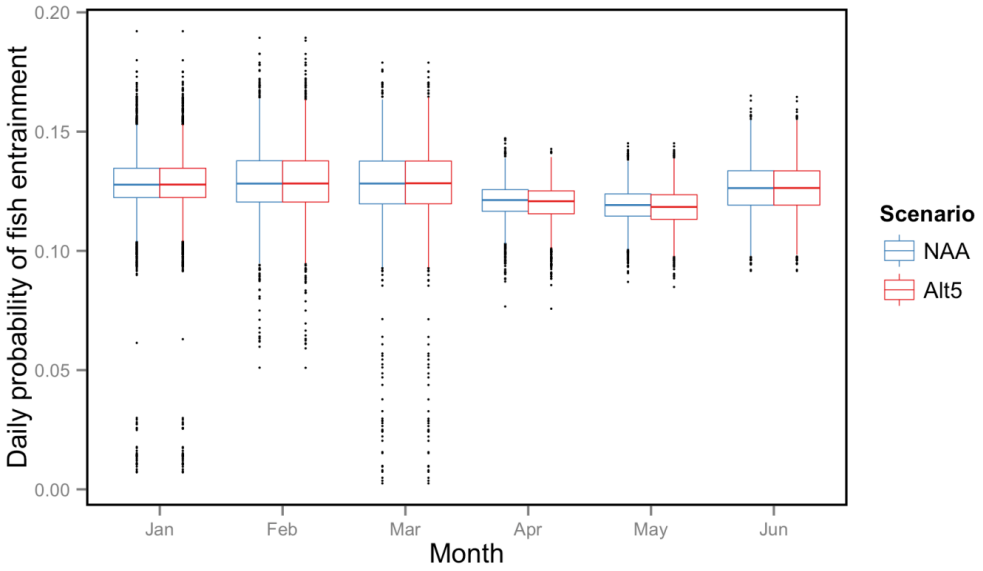

Figure 9L.22 Probability of Fish Entrainment into Columbia Cut under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

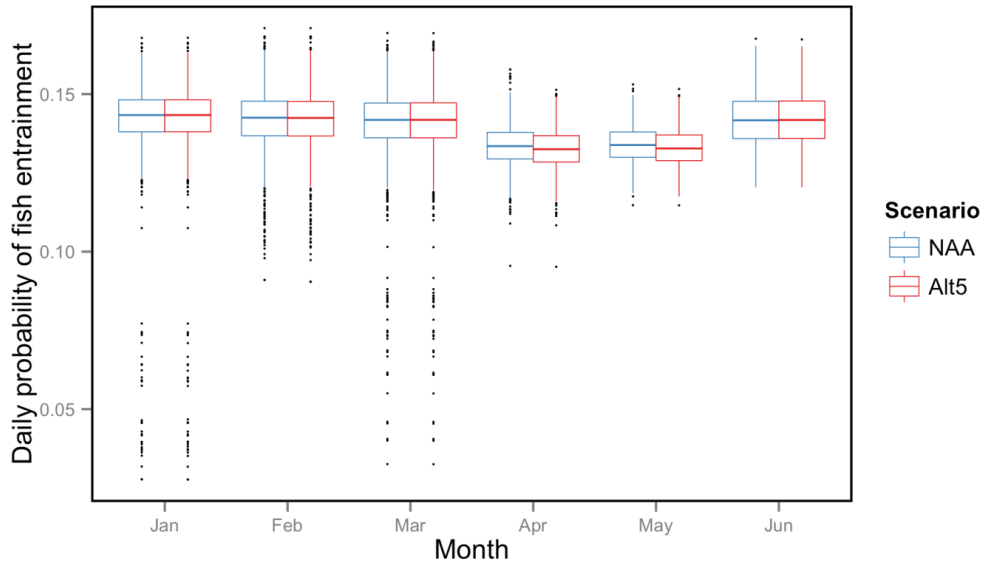

Figure 9L.23 Probability of Fish Entrainment into Middle River under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

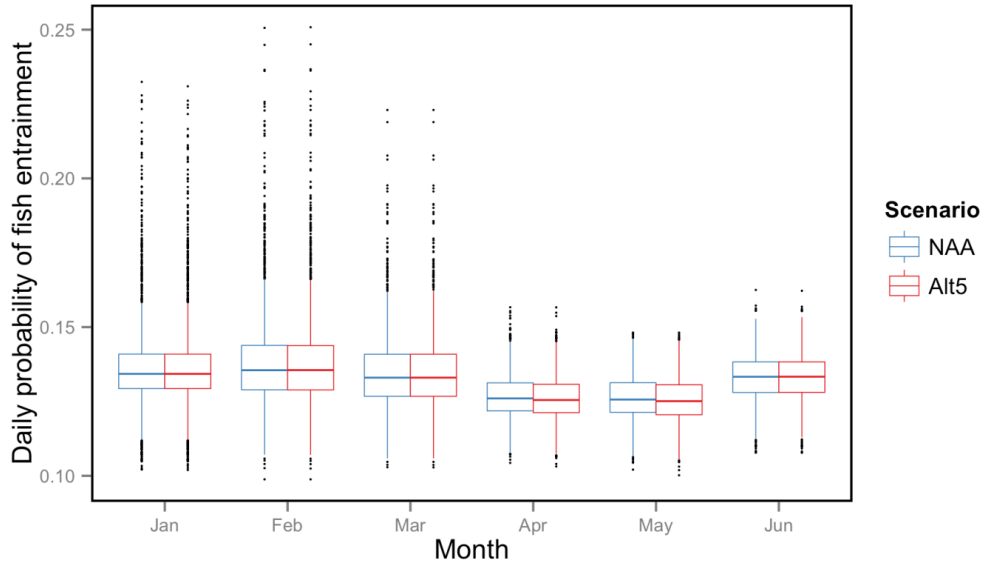

Figure 9L.24 Probability of Fish Entrainment into Old River under Alternative 5 (Alt 5) as compared to the No Action Alternative (NAA)

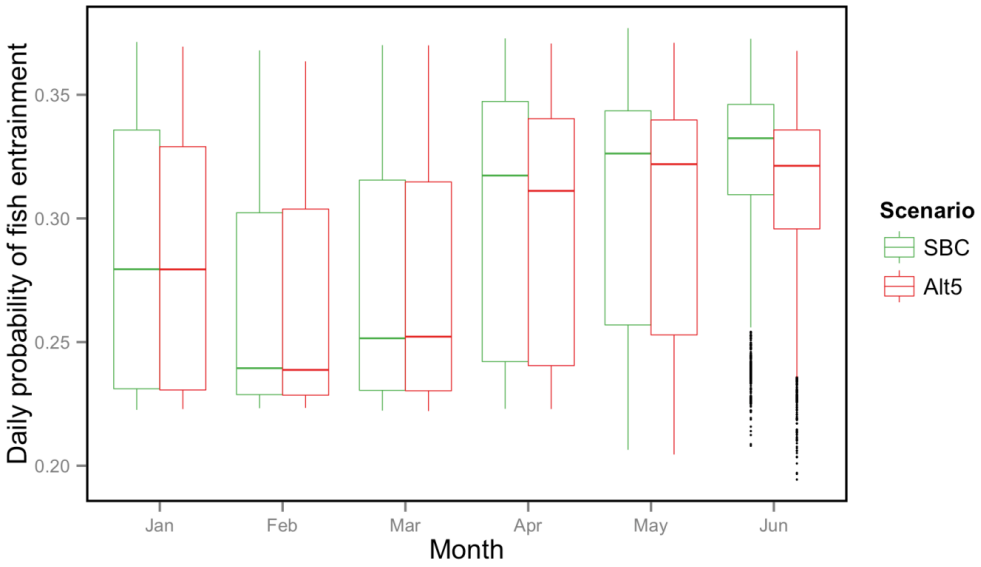

Figure 9L.25 Probability of Fish Entrainment into Georgiana Slough under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

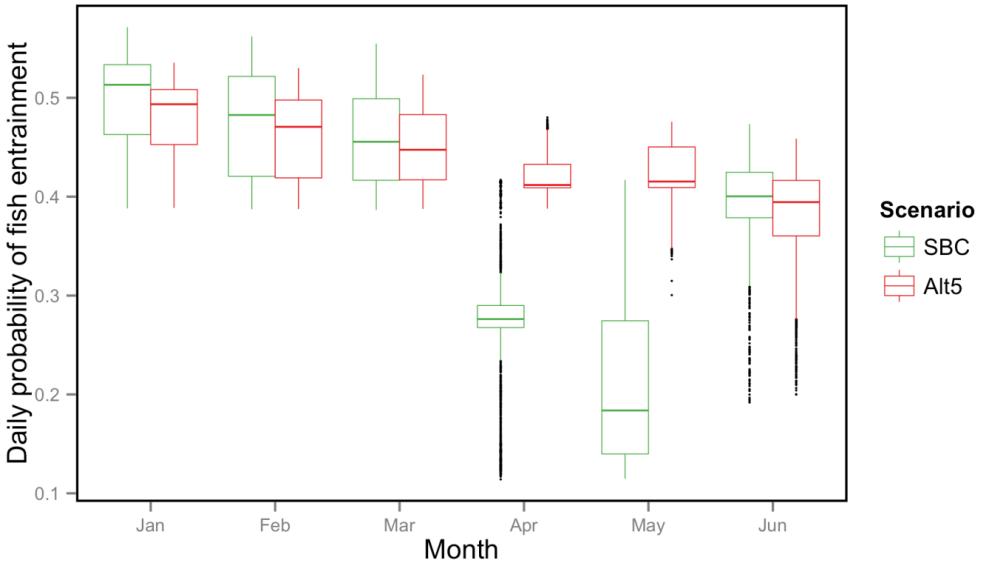

Figure 9L.26 Probability of Fish Entrainment into Head of Old River under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

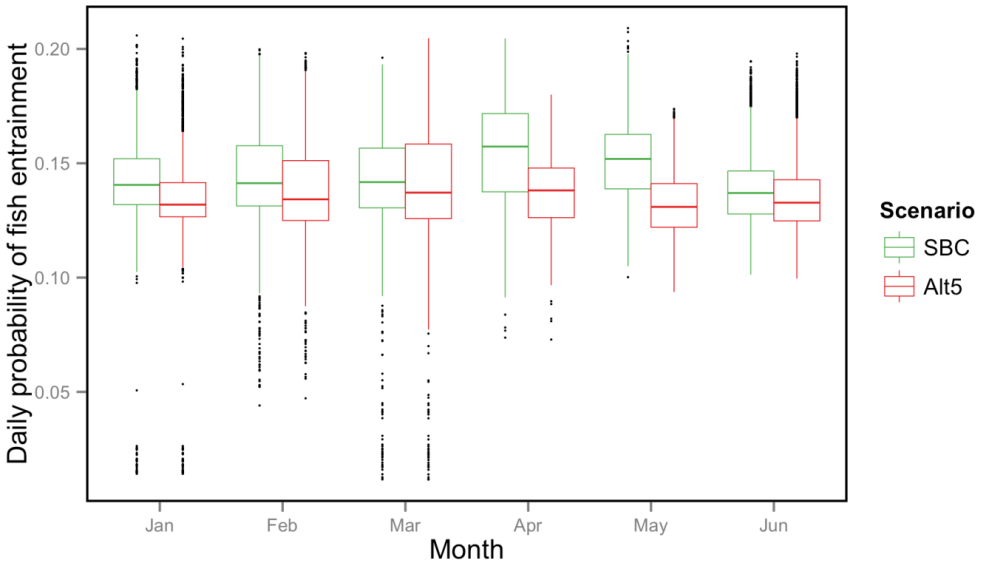

Figure 9L.27 Probability of Fish Entrainment into Turner Cut under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

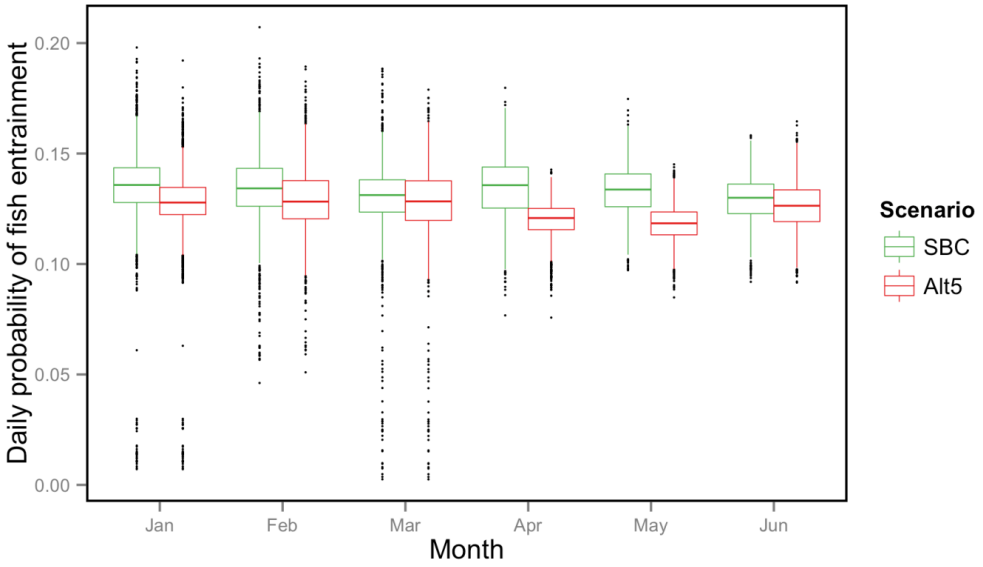

Figure 9L.28 Probability of Fish Entrainment into Columbia Cut under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

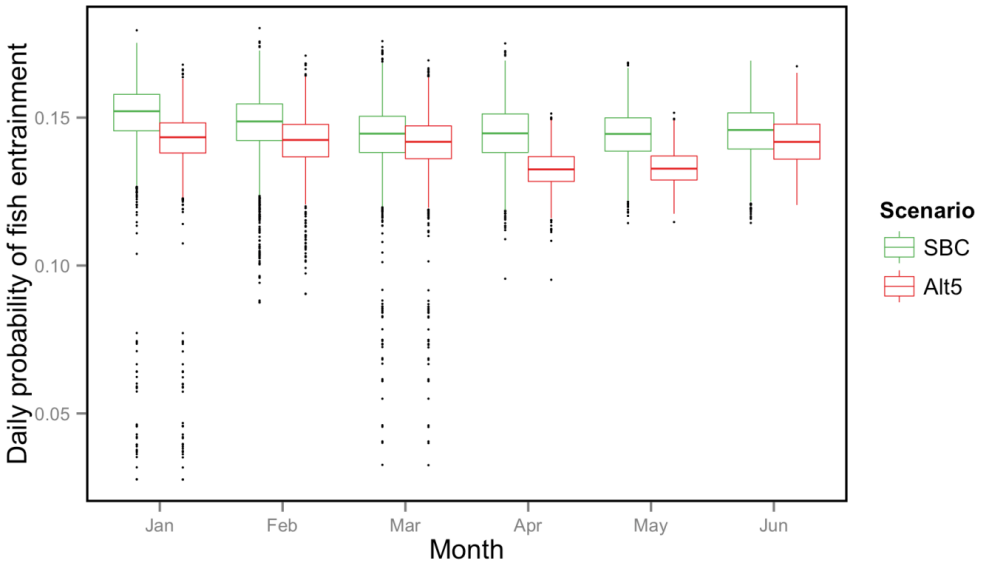

Figure 9L.29 Probability of Fish Entrainment into Middle River under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

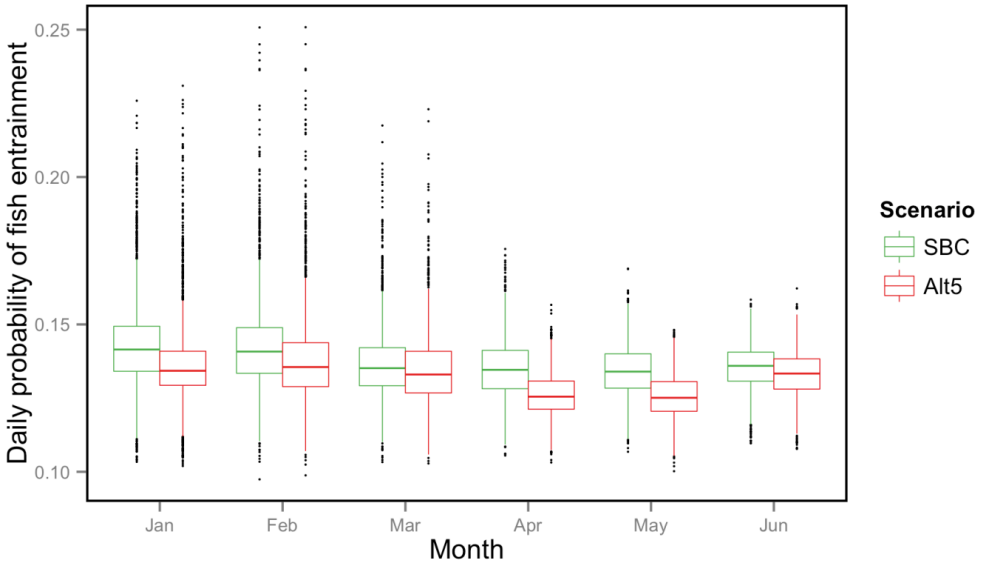

Figure 9L.30 Probability of Fish Entrainment into Old River under Alternative 5 (Alt 5) as compared to the Second Basis of Comparison (SBC)

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Appendix 9M

Salmonid Salvage Analysis Documentation

This appendix provides information about the methods and assumptions used for the Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS) analysis using the Salmonid Salvage analysis. This appendix is organized in two main sections as follows:

- Section 9M.1: Salmonid Salvage Analysis Methodology and Assumptions
  - The Salmonid Salvage analysis uses the statistical relationship published in Zeug and Cavallo (2014) to estimate the proportion of Chinook Salmon juveniles predicted to be salvaged each month from January through June. This section briefly describes the approach and assumptions of the Salmonid Salvage analysis.
- Section 9M.2: Salmonid Salvage Analysis Results
  - This section presents the results of the Salmonid Salvage analysis. Results are presented in a series of figures showing the proportion of Chinook Salmon salvaged in each month.

9M.1 Salmonid Salvage Analysis Methodology and Assumptions

9M.1.1 Salmonid Salvage Analysis Methodology

Predicted monthly salvage from January through June for each scenario was estimated using statistical relationships reported in Zeug and Cavallo (2014). In that analysis, salvage at the CVP and SWP was modeled as a function of physical, biological, and hydrologic variables. The data set used for the Sacramento River was comprised of over 700 releases between 1993 and 2007, which was made up of approximately 30 million individual Chinook Salmon. Three of the four Chinook Salmon races were represented (winter, fall, and late-fall runs) in the model. The salvage of San Joaquin River origin Chinook Salmon was also modeled. However, the range of data used to construct the San Joaquin River statistical model was significantly narrower than the range of flows and exports represented in the scenarios examined in this report. Thus, only the Sacramento River model was used to predict salvage of Sacramento River-origin Chinook Salmon races.

The statistical model presented in Zeug and Cavallo (2014) included several predictors that were not well supported by the data (not found to be significant in their analysis) or were not relevant for the prediction function used in this analysis. For example, a variable of “ocean recoveries” was used by Zeug and

Cavallo (2014) to quantify the effect of salvage on future recoveries in the ocean. This variable not relevant to the evaluation goals of the scenarios proposed herein. Thus, the statistical model was refitted using only significant and relevant predictor variables that included exports, river inflow, and fish size.

The resulting predictions of salvage probability were performed using average flow and export values in January, February, March, April, May, and June for each scenario. These flow and export values were model outputs from DSM2 and CalSim II hydrologic models. Fish size was fixed at 80 millimeter. The statistical model constructed by Zeug and Cavallo (2014) produced an estimated count of fish salvage with an offset variable that equals the number of fish in each release. To obtain a probability, the estimated count was divided by an offset variable. The probability of salvage was calculated for each week and then averaged for each month. The probability of salvage calculated by the model is independent of the number of fish available for salvage. Thus, a high probability of salvage may not be important if few fish are migrating through the delta at that time.

9M.1.2 Salmonid Salvage Analysis Scenario Assumptions

The Junction Entrainment analysis includes the following assumptions:

- The salvage model is applicable to spring-run Chinook Salmon, although only winter, fall, and late fall run Chinook Salmon were used to construct the statistical model.
- Exclusion of non-significant or irrelevant variables has little or no effect on predicted salvage.
- Hatchery fish used in the coded wire tag experiments are salvaged at a similar rate as natural-origin fish.

9M.2 Salmonid Salvage Analysis Results

The following scenario comparisons are presented in Figures 9M.1 through 9M.5, comparing the proportion of Chinook Salmon salvaged in each month over the 82-year CalSim II simulation period:

- No Action Alternative compared to the Second Basis of Comparison
- Alternative 3 compared to the No Action Alternative
- Alternative 3 compared to the Second Basis of Comparison
- Alternative 5 compared to the No Action Alternative
- Alternative 5 compared to the Second Basis of Comparison

9M.3 Reference

Zeug SZ, Cavallo BJ. 2014. "Controls on the Entrainment of Juvenile Chinook Salmon (Oncorhynchus tshawytscha) into Large Water Diversions and Estimates of Population-level Loss." *PLoS ONE* 9(7): e101479. Doi:10.1371/journal.pone.0101479

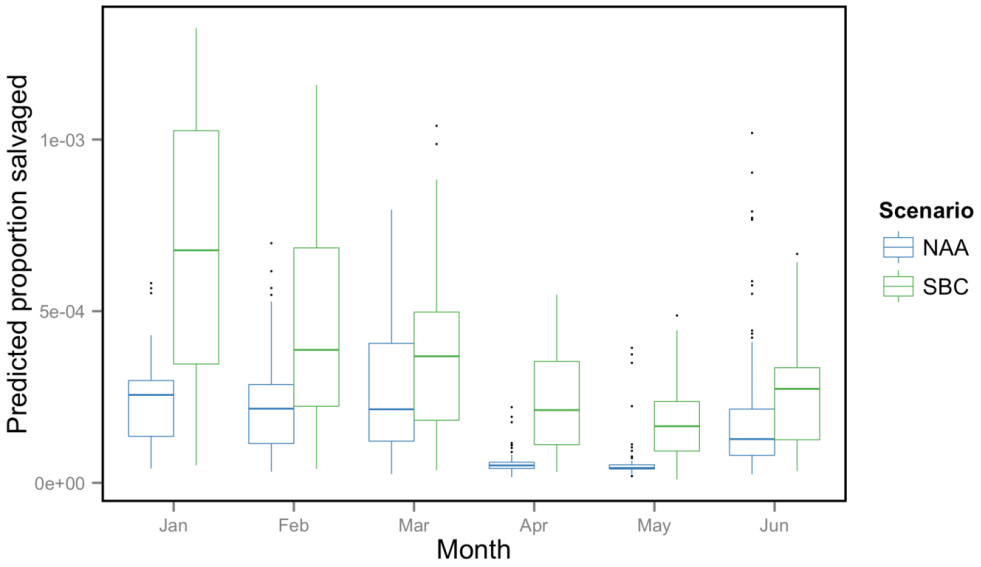

Figure 9M.1 Proportion of Chinook Salmon Salvaged in Each Month under the No Action Alternative (NAA) Compared to the Second Basis of Comparison (SBC)

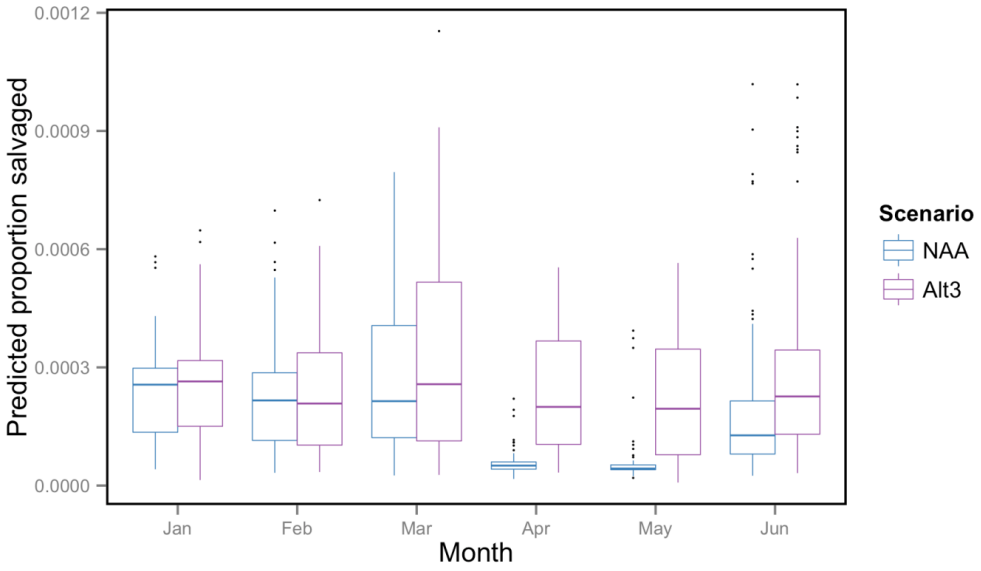

Figure 9M.2 Proportion of Chinook Salmon Salvaged in Each Month under Alternative 3 (Alt 3) Compared to the No Action Alternative (NAA)

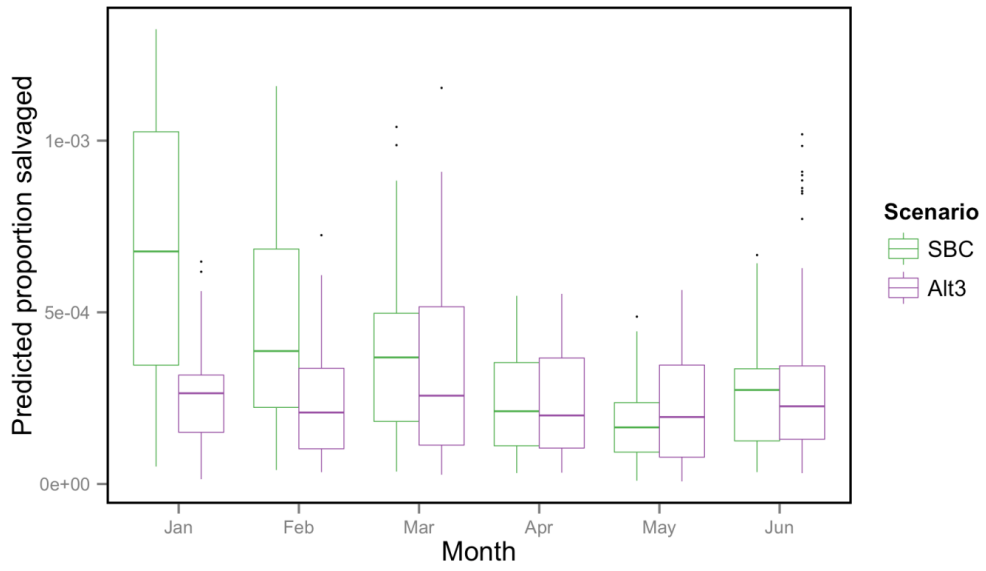

Figure 9M.3 Proportion of Chinook Salmon Salvaged in Each Month under Alternative 3 (Alt 3) as Compared to the Second Basis of Comparison (SBC)

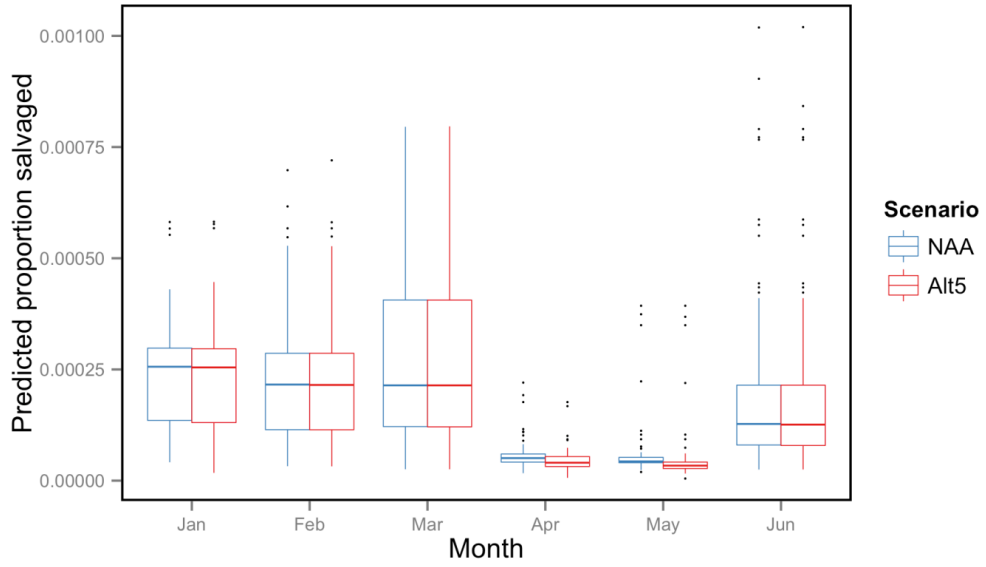

Figure 9M.4 Proportion of Chinook Salmon Salvaged in Each Month under Alternative 5 (Alt 5) as Compared to the No Action Alternative (NAA)

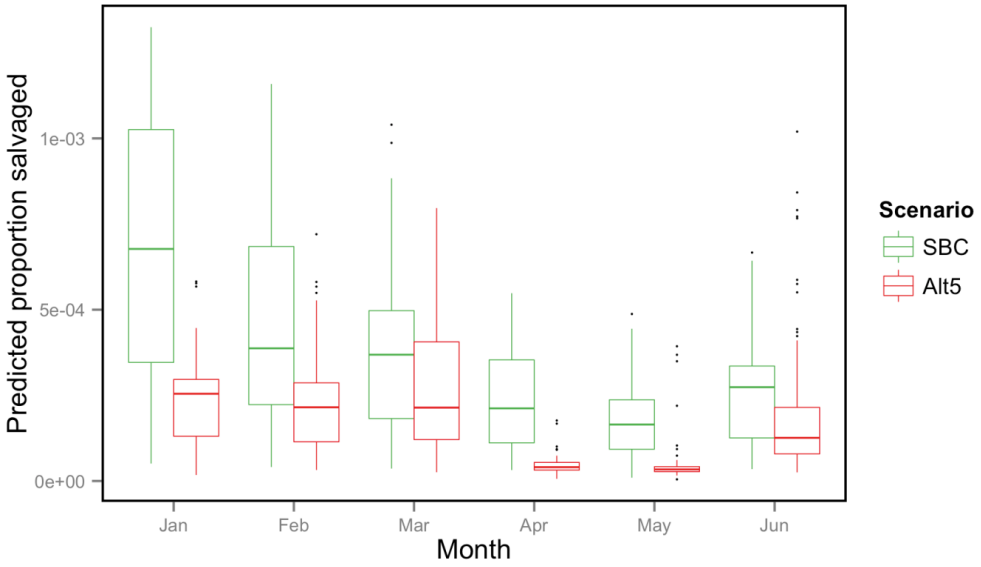

Figure 9M.5 Proportion of Chinook Salmon Salvaged in Each Month under Alternative 5 (Alt 5) as Compared to the Second Basis of Comparison (SBC)

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Appendix 9N

Temperature Threshold Analysis

9N.1 Temperature Threshold Methodology and Assumptions

Monthly temperature data described in Appendix 6B were used to calculate the percentage of time (over the period 81-year simulation record) monthly temperature thresholds for different fish species and life stages were exceeded on the Trinity River, Clear Creek, Sacramento River, Feather River, American River, and Stanislaus River.

9N.2 Temperature Threshold Results

Table 9N.B.1 shows the percentage of years, over the 81-year simulation period, each of the different temperature thresholds was exceeded for the No Action Alternative, Second Basis of Comparison (Alternative 1), Alternative 3, and Alternative 5 as well as differences between the alternatives and the bases of comparison. Columns A through H describe the specific temperature threshold by species, life stage, river, reach, water year type, month, the actual temperature objective, and the reference where the target came from. Columns I through R show the threshold exceedances for each alternative and alternative comparison.

9N.3 References

DWR et al. (California Department of Water Resources, Bureau of Reclamation, U.S. Fish and Wildlife Service, and National Marine Fisheries Service). 2013. *Environmental Impact Report/ Environmental Impact Statement for the Bay Delta Conservation Plan. Draft*. December.

National Marine Fisheries Service 2009. Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project. June.

USFWS (U.S. Fish and Wildlife Service). 1999. *Trinity River Flow Evaluation. Final Report.* June.

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Table 9N.B.1. Temperature Threshold Exceedances

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Spring-Run Chinook	Holding	Trinity	Lewiston to Douglas City Bridge	All	July	60	USFWS 1999	1%	1%	0%	1%	0%	-1%	0%	0%	-1%	0%
Spring-Run Chinook	Holding	Trinity	Lewiston to Douglas City Bridge	All	August	60	USFWS 1999	2%	2%	2%	0%	0%	0%	-2%	0%	0%	-2%
Spring-Run Chinook	Spawning	Trinity	Lewiston to Douglas City Bridge	All	September	56	USFWS 1999	9%	11%	9%	7%	2%	1%	-1%	-2%	-1%	-4%
Chinook	Spawning	Trinity	Lewiston to NF confluence	All	October	56	USFWS 1999	8%	6%	6%	7%	-1%	-2%	0%	1%	-1%	1%
Coho	Spawning	Trinity	Lewiston to NF confluence	All	October	56	USFWS 1999	8%	6%	6%	7%	-1%	-2%	0%	1%	-1%	1%
Steelhead	Spawning	Trinity	Lewiston to NF confluence	All	October	56	USFWS 1999	8%	6%	6%	7%	-1%	-2%	0%	1%	-1%	1%
Chinook	Spawning	Trinity	Lewiston to NF confluence	All	November	56	USFWS 1999	2%	2%	0%	2%	0%	-2%	0%	0%	-2%	0%
Coho	Spawning	Trinity	Lewiston to NF confluence	All	November	56	USFWS 1999	2%	2%	0%	2%	0%	-2%	0%	0%	-2%	0%
Steelhead	Spawning	Trinity	Lewiston to NF confluence	All	November	56	USFWS 1999	2%	2%	0%	2%	0%	-2%	0%	0%	-2%	0%
Chinook	Spawning	Trinity	Lewiston to NF confluence	All	December	56	USFWS 1999	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Coho	Spawning	Trinity	Lewiston to NF confluence	All	December	56	USFWS 1999	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Spawning	Trinity	Lewiston to NF confluence	All	December	56	USFWS 1999	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Clear Creek	Igo	All	June	60	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Clear Creek	Igo	All	July	60	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Clear Creek	Igo	All	August	60	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Spring-Run Chinook	Rearing	Clear Creek	Igo	All	September	56	BDCP 2013	15%	13%	12%	14%	-3%	-4%	-2%	3%	-1%	1%
Spring-Run Chinook	Rearing	Clear Creek	Igo	All	October	56	BDCP 2013	12%	10%	11%	12%	-2%	-2%	0%	2%	1%	2%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	April	56	NMFS NMFS BiOp 2009 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	May	56	NMFS BiOp 2009	3%	4%	4%	3%	1%	1%	0%	-1%	0%	-1%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	June	56	NMFS BiOp 2009	6%	4%	4%	7%	-2%	-2%	1%	2%	0%	3%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	July	56	NMFS BiOp 2009	14%	11%	11%	13%	-3%	-3%	-1%	3%	0%	2%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	August	56	NMFS BiOp 2009	32%	28%	28%	31%	-3%	-4%	0%	3%	0%	3%
Winter-Run Chinook	Egg incubation	Sacramento	Balls Ferry	All	September	56	NMFS BiOp 2009	42%	52%	49%	41%	10%	6%	-1%	-10%	-4%	-11%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	April	56	NMFS BiOp 2009	4%	4%	4%	4%	-1%	-1%	0%	1%	0%	1%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	May	56	NMFS BiOp 2009	44%	42%	44%	47%	-2%	0%	3%	2%	2%	5%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	June	56	NMFS BiOp 2009	52%	44%	44%	54%	-8%	-8%	1%	8%	0%	10%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	July	56	NMFS BiOp 2009	55%	59%	58%	54%	4%	3%	-1%	-4%	-1%	-5%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	August	56	NMFS BiOp 2009	89%	85%	89%	90%	-4%	0%	1%	4%	4%	5%
Winter-Run Chinook	Egg incubation	Sacramento	Bend Bridge	All	September	56	NMFS BiOp 2009	62%	90%	87%	60%	29%	26%	-1%	-29%	-3%	-30%
Green Sturgeon	Egg incubation	Sacramento	Bend Bridge	All	May	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Egg incubation	Sacramento	Bend Bridge	All	June	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Green Sturgeon	Egg incubation	Sacramento	Bend Bridge	All	July	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Egg incubation	Sacramento	Bend Bridge	All	August	63	BDCP 2013	7%	6%	6%	7%	-1%	-1%	0%	1%	0%	1%
Green Sturgeon	Egg incubation	Sacramento	Bend Bridge	All	September	63	BDCP 2013	12%	10%	9%	12%	-3%	-3%	-1%	3%	-1%	2%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	October	56	BDCP 2013	82%	79%	78%	80%	-4%	-4%	-2%	4%	0%	2%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	November	56	BDCP 2013	8%	7%	8%	7%	-1%	0%	-2%	1%	1%	-1%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	December	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	March	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	April	56	BDCP 2013	15%	13%	14%	14%	-2%	-1%	-1%	2%	1%	1%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	October	56	BDCP 2013	82%	79%	78%	80%	-4%	-4%	-2%	4%	0%	2%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	November	56	BDCP 2013	8%	7%	8%	7%	-1%	0%	-2%	1%	1%	-1%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	December	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	March	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Fall-Run Chinook	Egg incubation	Sacramento	Red Bluff	All	April	56	BDCP 2013	15%	13%	14%	14%	-2%	-1%	-1%	2%	1%	1%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	October	56	BDCP 2013	82%	79%	78%	80%	-4%	-4%	-2%	4%	0%	2%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	November	56	BDCP 2013	8%	7%	8%	7%	-1%	0%	-2%	1%	1%	-1%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	December	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	March	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Spawning	Sacramento	Red Bluff	All	April	56	BDCP 2013	15%	13%	14%	14%	-2%	-1%	-1%	2%	1%	1%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	October	56	BDCP 2013	82%	79%	78%	80%	-4%	-4%	-2%	4%	0%	2%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	November	56	BDCP 2013	8%	7%	8%	7%	-1%	0%	-2%	1%	1%	-1%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	December	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	March	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall-Run Chinook	Spawning	Sacramento	Red Bluff	All	April	56	BDCP 2013	15%	13%	14%	14%	-2%	-1%	-1%	2%	1%	1%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	March	61	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
White Sturgeon	Spawning	Sacramento	Hamilton City	All	April	61	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	May	61	BDCP 2013	55%	49%	49%	56%	-6%	-6%	1%	6%	0%	7%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	June	61	BDCP 2013	86%	74%	74%	87%	-13%	-13%	1%	13%	0%	13%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	March	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	April	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	May	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Spawning	Sacramento	Hamilton City	All	June	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	March	61	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	April	61	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	May	61	BDCP 2013	55%	49%	49%	56%	-6%	-6%	1%	6%	0%	7%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	June	61	BDCP 2013	86%	74%	74%	87%	-13%	-13%	1%	13%	0%	13%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	March	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	April	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	May	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
White Sturgeon	Egg incubation	Sacramento	Hamilton City	All	June	68	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	September	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	October	56	BDCP 2013	98%	97%	97%	97%	-1%	-1%	-1%	1%	-1%	0%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	November	56	BDCP 2013	27%	26%	26%	28%	-1%	-1%	1%	1%	-1%	2%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	March	56	BDCP 2013	18%	20%	19%	19%	2%	1%	1%	-2%	-1%	-1%
Spring-Run Chinook	Egg incubation	Feather	Robinson Riffle	All	April	56	BDCP 2013	75%	75%	75%	75%	0%	0%	0%	0%	0%	0%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	September	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	October	56	BDCP 2013	98%	97%	97%	97%	-1%	-1%	-1%	1%	-1%	0%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	November	56	BDCP 2013	27%	26%	26%	28%	-1%	-1%	1%	1%	-1%	2%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	March	56	BDCP 2013	18%	20%	19%	19%	2%	1%	1%	-2%	-1%	-1%
Steelhead	Egg incubation	Feather	Robinson Riffle	All	April	56	BDCP 2013	75%	75%	75%	75%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	September	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	October	56	BDCP 2013	98%	97%	97%	97%	-1%	-1%	-1%	1%	-1%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	November	56	BDCP 2013	27%	26%	26%	28%	-1%	-1%	1%	1%	-1%	2%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	March	56	BDCP 2013	18%	20%	19%	19%	2%	1%	1%	-2%	-1%	-1%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	April	56	BDCP 2013	75%	75%	75%	75%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	September	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	October	56	BDCP 2013	98%	97%	97%	97%	-1%	-1%	-1%	1%	-1%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	November	56	BDCP 2013	27%	26%	26%	28%	-1%	-1%	1%	1%	-1%	2%
Steelhead	Rearing	Feather	Robinson Riffle	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Steelhead	Rearing	Feather	Robinson Riffle	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	February	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	March	56	BDCP 2013	18%	20%	19%	19%	2%	1%	1%	-2%	-1%	-1%
Steelhead	Rearing	Feather	Robinson Riffle	All	April	56	BDCP 2013	75%	75%	75%	75%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	May	63	BDCP 2013	60%	51%	55%	57%	-9%	-5%	-2%	9%	4%	6%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	June	63	BDCP 2013	97%	97%	97%	97%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	July	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Spring-Run Chinook	Rearing	Feather	Robinson Riffle	All	August	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	May	63	BDCP 2013	60%	51%	55%	57%	-9%	-5%	-2%	9%	4%	6%
Steelhead	Rearing	Feather	Robinson Riffle	All	June	63	BDCP 2013	97%	97%	97%	97%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	July	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Robinson Riffle	All	August	63	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	October	56	BDCP 2013	98%	98%	98%	98%	-1%	-1%	0%	1%	0%	0%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	November	56	BDCP 2013	26%	24%	23%	26%	-1%	-3%	0%	1%	-1%	1%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	February	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	March	56	BDCP 2013	29%	28%	26%	29%	-2%	-4%	0%	2%	-2%	2%
Fall Chinook	Spawning	Feather	Gridley Bridge	All	April	56	BDCP 2013	85%	85%	85%	85%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Gridley Bridge	All	October	56	BDCP 2013	98%	98%	98%	98%	-1%	-1%	0%	1%	0%	0%
Steelhead	Rearing	Feather	Gridley Bridge	All	November	56	BDCP 2013	26%	24%	23%	26%	-1%	-3%	0%	1%	-1%	1%
Steelhead	Rearing	Feather	Gridley Bridge	All	December	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Steelhead	Rearing	Feather	Gridley Bridge	All	January	56	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Rearing	Feather	Gridley Bridge	All	February	56	BDCP 2013	1%	0%	0%	1%	-1%	-1%	0%	1%	0%	1%
Steelhead	Rearing	Feather	Gridley Bridge	All	March	56	BDCP 2013	29%	28%	26%	29%	-2%	-4%	0%	2%	-2%	2%
Steelhead	Rearing	Feather	Gridley Bridge	All	April	56	BDCP 2013	85%	85%	85%	85%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Spawning	Feather	Gridley Bridge	All	May	64	BDCP 2013	65%	56%	57%	64%	-9%	-7%	-1%	9%	1%	7%
Green Sturgeon	Spawning	Feather	Gridley Bridge	All	June	64	BDCP 2013	97%	97%	97%	97%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Spawning	Feather	Gridley Bridge	All	July	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Spawning	Feather	Gridley Bridge	All	August	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Spawning	Feather	Gridley Bridge	All	September	64	BDCP 2013	48%	83%	81%	49%	35%	33%	2%	-35%	-2%	-33%
Green Sturgeon	Egg incubation	Feather	Gridley Bridge	All	May	64	BDCP 2013	65%	56%	57%	64%	-9%	-7%	-1%	9%	1%	7%
Green Sturgeon	Egg incubation	Feather	Gridley Bridge	All	June	64	BDCP 2013	97%	97%	97%	97%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Egg incubation	Feather	Gridley Bridge	All	July	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Egg incubation	Feather	Gridley Bridge	All	August	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Egg incubation	Feather	Gridley Bridge	All	September	64	BDCP 2013	48%	83%	81%	49%	35%	33%	2%	-35%	-2%	-33%
Green Sturgeon	Rearing	Feather	Gridley Bridge	All	May	64	BDCP 2013	65%	56%	57%	64%	-9%	-7%	-1%	9%	1%	7%
Green Sturgeon	Rearing	Feather	Gridley Bridge	All	June	64	BDCP 2013	97%	97%	97%	97%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Green Sturgeon	Rearing	Feather	Gridley Bridge	All	July	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Rearing	Feather	Gridley Bridge	All	August	64	BDCP 2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Green Sturgeon	Rearing	Feather	Gridley Bridge	All	September	64	BDCP 2013	48%	83%	81%	49%	35%	33%	2%	-35%	-2%	-33%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	May	65	BDCP 2013	31%	31%	33%	32%	0%	2%	0%	0%	2%	0%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	June	65	BDCP 2013	56%	57%	55%	56%	1%	0%	0%	-1%	-1%	-1%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	July	65	BDCP 2013	99%	99%	99%	99%	0%	0%	0%	0%	0%	0%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	August	65	BDCP 2013	93%	93%	93%	94%	-1%	0%	0%	1%	1%	1%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	September	65	BDCP 2013	89%	96%	96%	90%	7%	7%	1%	-7%	0%	-6%
Juvenile steelhead	Rearing	American	Watt Ave Bridge	All	October	65	BDCP 2013	28%	28%	30%	28%	0%	2%	0%	0%	3%	0%
Steelhead	Adult Migration	Stanislaus	Orange Blossom Bridge	All	October	56	NMFS BiOp 2009	57%	85%	87%	58%	28%	31%	2%	-28%	2%	-27%
Steelhead	Adult Migration	Stanislaus	Orange Blossom Bridge	All	November	56	NMFS BiOp 2009	33%	28%	24%	36%	-5%	-9%	3%	5%	-4%	8%
Steelhead	Adult Migration	Stanislaus	Orange Blossom Bridge	All	December	56	NMFS BiOp 2009	0%	0%	0%	3%	0%	0%	3%	0%	0%	3%
Steelhead	Smoltification	Stanislaus	Knights Ferry (*Used Below Goodwin Dam)	All	January	52	NMFS BiOp 2009	0%	2%	2%	2%	2%	2%	2%	-2%	0%	0%
Steelhead	Smoltification	Stanislaus	Knights Ferry (*Used Below Goodwin Dam)	All	February	52	NMFS BiOp 2009	0%	2%	2%	0%	2%	2%	0%	-2%	0%	-2%
Steelhead	Smoltification	Stanislaus	Knights Ferry (*Used Below Goodwin Dam)	All	March	52	NMFS BiOp 2009	8%	9%	12%	8%	1%	4%	0%	-1%	3%	-1%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Steelhead	Smoltification	Stanislaus	Knights Ferry (*Used Below Goodwin Dam)	All	April	52	NMFS BiOp 2009	33%	31%	30%	37%	-2%	-2%	5%	2%	-1%	6%
Steelhead	Smoltification	Stanislaus	Knights Ferry (*Used Below Goodwin Dam)	All	May	52	NMFS BiOp 2009	63%	66%	63%	68%	3%	0%	5%	-3%	-3%	2%
Steelhead	Smoltification	Stanislaus	Orange Blossom Bridge	All	January	57	NMFS BiOp 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Smoltification	Stanislaus	Orange Blossom Bridge	All	February	57	NMFS BiOp 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Smoltification	Stanislaus	Orange Blossom Bridge	All	March	57	NMFS BiOp 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Smoltification	Stanislaus	Orange Blossom Bridge	All	April	57	NMFS BiOp 2009	2%	8%	3%	0%	6%	1%	-2%	-6%	-4%	-8%
Steelhead	Smoltification	Stanislaus	Orange Blossom Bridge	All	May	57	NMFS BiOp 2009	18%	10%	17%	8%	-8%	-1%	-11%	8%	7%	-3%
Steelhead	Spawning	Stanislaus	Orange Blossom Bridge	All	January	55	NMFS BiOp 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Steelhead	Spawning	Stanislaus	Orange Blossom Bridge	All	February	55	NMFS BiOp 2009	0%	0%	1%	0%	0%	1%	0%	0%	1%	0%
Steelhead	Spawning	Stanislaus	Orange Blossom Bridge	All	March	55	NMFS BiOp 2009	21%	16%	25%	21%	-5%	3%	-1%	5%	8%	4%
Steelhead	Spawning	Stanislaus	Orange Blossom Bridge	All	April	55	NMFS BiOp 2009	16%	34%	17%	7%	17%	1%	-9%	-17%	-16%	-26%
Steelhead	Spawning	Stanislaus	Orange Blossom Bridge	All	May	55	NMFS BiOp 2009	49%	43%	53%	40%	-5%	4%	-8%	5%	10%	-3%
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	June	65	NMFS BiOp 2009	6%	2%	4%	6%	-3%	-1%	0%	3%	2%	3%
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	July	65	NMFS BiOp 2009	16%	16%	19%	21%	-1%	3%	5%	1%	4%	6%

[1]See section 9N.C for the full reference

Species	Lifestage	River	Reach	Water Year Type	Month	Temperature Objective (Degree F)	Temperature Objective Reference[1]	No Action Alternative	Second Basis of Comparison (Alternative 1)	Alternative 3	Alternative 5	Alternative 1 minus No Action Alternative	Alternative 3 minus No Action Alternative	Alternative 5 minus No Action Alternative	No Action Alternative minus Second Basis of Comparison	Alternative 3 minus Second Basis of Comparison	Alternative 5 minus Second Basis of Comparison
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	August	65	NMFS BiOp 2009	15%	13%	9%	21%	-2%	-6%	6%	2%	-4%	8%
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	September	65	NMFS BiOp 2009	11%	10%	7%	18%	0%	-4%	8%	0%	-3%	8%
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	October	65	NMFS BiOp 2009	7%	8%	4%	11%	1%	-3%	4%	-1%	-4%	3%
Steelhead	Rearing	Stanislaus	Orange Blossom Bridge	All	November	65	NMFS BiOp 2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

[1]See section 9N.C for the full reference

Appendix 10A

Special-Status Terrestrial Species

Tables 10A.1 and 10A.2 list special-status wildlife and plant species that occur within the study area and could be affected by changes under Alternatives 1 through 5 as compared to the No Action Alternative and Second Basis of Comparison. These changes could occur with the Central Valley Project and State Water Project operations or ecosystem restoration activities, and the potential for impacts is based on the likelihood of operational changes or restoration actions affecting suitable habitat for the listed species in the defined area of analysis.

The area of analysis for operational changes includes open water areas of reservoirs, rivers, and creeks; adjacent riparian vegetation; wetlands supported by these water bodies; potential restoration areas in Yolo Bypass and Suisun Marsh.

Species are presented in alphabetical order based on scientific name.

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Table 10A.1 Special-Status Wildlife Species

Common Name	Scientific Name	Status Federal/State/ CDFW*	Habitat/Distribution	Areas with Potential for Occurrence	Impact Potential
Burrowing Owl (nesting and wintering sites)	*Athene cunicularia*	--/--/SSC	Nests and forages in grasslands, shrub lands, deserts, and agricultural fields, especially where ground squirrel burrows are present. Occurs near New Melones Reservoir. Unlikely to occur along the Sacramento River corridor due to a lack of suitable nesting habitat. Known to occur in suitable habitat in the Yolo Bypass, in the Chowchilla Bypass, on the San Luis NWR complex, and at Mendota Pool.	Sacramento, Feather, American, Yolo, Stanislaus, San Joaquin, Delta, San Luis	Low potential to be affected by restoration in Yolo Bypass.
Swainson's Hawk (nesting)	*Buteo swainsoni*	BCC/T/--	Nests in riparian woodlands, roadside trees, tree rows, isolated trees, woodlots, and trees in farmyards and rural residences. Forages in grasslands and agricultural fields in Central Valley. Occurs near New Melones Reservoir. Known to nest in suitable habitat on the San Luis NWR complex and Great Valley Grasslands State Park and other areas along the San Joaquin River. Suitable nesting and foraging habitat is present along Sacramento River.	Sacramento, Feather, American, Yolo, San Joaquin, Stanislaus, Delta, San Luis	Low potential to be affected by changes in foraging habitat in agricultural areas influenced by operations; low potential for nesting habitat to be affected by operational changes in flow.
Western Yellow-billed Cuckoo (nesting)	*Coccyzus americanus occidentalis*	T/E/--	Densely foliaged, deciduous trees and shrubs, especially willows, required for roosting sites. An uncommon to rare summer resident of valley foothill and desert riparian habitats in scattered locations in California. Breeding pairs known from Sacramento Valley. Reclamation (2010) concluded this species could potentially occur near New Melones Reservoir. Detected by BDCP surveys in 2009 near Walnut Grove. Likely to nest and forage in the upper Sacramento River area.	Trinity, Clear Creek, Sacramento, Feather, Delta, New Melones, San Joaquin	Low potential for operations to affect riparian vegetation used for nesting by this species.
Valley Elderberry Longhorn Beetle	*Desmocerus californicus dimorphus*	T/--/--	Found only in association with its host plant, blue elderberry (*Sambucus mexicana*). In the Central Valley, the elderberry shrub is found primarily in riparian vegetation. Known to occur in elderberry shrubs present in the riparian woodland and expected to occur in suitable habitat in other locations along the San Joaquin River. Recorded at Caswell Memorial State Park and other locations along the Stanislaus River.	Trinity, Sacramento, Feather, American, San Joaquin, Stanislaus, Delta, San Luis	Low potential to be affected by changes in flow that influence riparian vegetation.
Greater Sandhill Crane (nesting and wintering)	*Grus canadensis tabida*	FS/T/FP	Eight distinct wintering locations in the Central Valley from Chico/Butte Sink on the north to Pixley National Wildlife Refuge near Delano on the south, with more than 95 percent occurring within the Sacramento Valley between Butte Sink and the Delta. Unlikely to breed in the upper Sacramento River area. Known to occur during winter in suitable habitat on the San Luis NWR complex, along the San Joaquin River, and in the Delta.	Sacramento, Feather, Yolo, San Joaquin	Low potential to be affected by restoration in the Yolo Bypass and changes in operations that influence crop patterns.
Bald Eagle (nesting and wintering)	*Haliaeetus leucocephalus*	--/E/FP	Requires large bodies of water or free-flowing rivers with abundant fish and adjacent snags or other perches for foraging. Occurs near New Melones Reservoir, Whiskeytown Lake, Trinity Lake, and Lewiston Reservoir. Known to nest in suitable habitat around Lake Millerton and in the Chowchilla Bypass.	Trinity, Clear Creek, Shasta, Sacramento, Feather, American, Yolo, Stanislaus, San Joaquin, Delta, San Luis	Low potential to be affected by changes in elevation at reservoirs.
California Black Rail	*Laterallus jamaicensis coturniculus*	BCC/T/FP	Tidal marshes in the northern San Francisco Bay estuary, Tomales Bay, Bolinas Lagoon, the Delta, Morro Bay, the Salton Sea, and the lower Colorado River. Found recently at several inland freshwater sites in the Sierra Nevada foothills in Butte, Yuba, and Nevada counties, the Cosumnes River Preserve in south Sacramento County, and Bidwell Park in Chico, Butte County.	Delta	Low potential to be affected by tidal marsh restoration.
California Ridgeway's Rail	*Rallus longirostris obsoletus*	E/E/FP	Dense marshy areas of the Bay-Delta region and Suisun Marsh.	Delta, Suisun	Low potential to be affected by tidal marsh restoration.
Salt Marsh Harvest Mouse	*Reithrodontomys raviventris*	E/E/FP	Found only in saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed saline emergent wetland is preferred habitat, where it may be locally common. Grasslands adjacent to pickleweed marsh are used, but only when new grass growth affords suitable cover in spring and summer. Reported occurrences of the salt marsh harvest mouse from within the Delta are restricted to salt and brackish tidal marshes along the northern edge of the Sacramento River and the southern edge of the San Joaquin River as far east as the vicinity of Collinsville and Antioch, west of Sherman Island	Delta, Suisun	Low potential to be affected by tidal marsh restoration and changes in water quality that influence habitat suitability.

Common Name	Scientific Name	Status Federal/State/ CDFW*	Habitat/Distribution	Areas with Potential for Occurrence	Impact Potential
Bank Swallow (nesting)	*Riparia riparia*	--/T/--	Neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. In summer, restricted to riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with fine-textured or sandy soils, into which it digs nesting holes. Approx. 75% of the current breeding population in California occurs along banks of the Sacramento and Feather rivers in the northern Central Valley.	Trinity, Clear Creek, Sacramento, Feather, American, Yolo, New Melones, San Joaquin, Delta	Low potential to be affected by operational changes that influence flows adjacent to nesting sites.
Giant Garter Snake	*Thamnophis gigas*	T/T/--	Marshes, ponds, sloughs, small lakes, low-gradient streams, and other waterways, and in agricultural wetlands, including irrigation and drainage canals, rice fields, and adjacent uplands. Current distribution extends from near Chico in Butte County south to the Mendota Wildlife Area in Fresno County. Known from White Slough/Caldoni Marsh and Yolo Basin/Willow Slough. Known to occur in suitable habitat on the San Luis NWR complex and in the Mendota Wildlife Area; reported from Mendota Pool.	Sacramento, Feather, American, Yolo, Delta, San Joaquin	Low potential to be affected by restoration in Yolo Bypass and operational changes that influence the acreage in rice production.
Tricolored Blackbird (nesting colony)	*Agelaius tricolor*	BCC/--/SSC	Nests colonially in tules, cattails, willows, thistles, blackberries, and other dense vegetation. Forages in grasslands and agricultural fields. Reclamation (2010) concluded this species occurs near New Melones Reservoir. Suitable nesting and foraging habitat is present in the upper Sacramento River area. Known to occur in suitable habitat on the San Luis NWR complex and other sites in the Yolo Bypass.	Sacramento, Feather, Yolo, American, Delta, Stanislaus.	Low potential to be affected by restoration activities in the Yolo Bypass.
Tule Greater White-fronted Goose (wintering)	*Anser albifrons elgasi*	--/--/SSC	Winters in California. Associates with dense tule–cattail marsh habitat. Has been documented near Sherman Island and at various locations in the Suisun Marsh. Winters at Sacramento Valley wildlife refuges and surrounding rice fields, Suisun Marsh, and Grizzly Island Wildlife Area.	Sacramento, Delta, Suisun	Low potential to be affected by restoration activities that increase inundated floodplain or flooded agricultural fields (e.g., winter flooding of rice fields).
Short-eared Owl (nesting)	*Asio flammeus*	--/--/SSC	Widespread winter migrant, found primarily in the Central Valley, in the western Sierra Nevada foothills, and along the coastline. Usually found in open areas with few trees, such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands. Occasionally still breeds in northern California. Known to occur in suitable habitat on the San Luis NWR complex, where it possibly also nests. Breeding range includes coastal areas in Del Norte and Humboldt counties, the San Francisco Bay Delta, northeastern Modoc plateau, the east side of the Sierra from Lake Tahoe south to Inyo County, and the San Joaquin Valley	Sacramento, Feather, Yolo, Delta, Suisun, San Joaquin	Low potential for changes in acreage of agricultural land and cropping patterns to affect this species.
Ringtail	*Bassariscus astutus*	--/--/FP	Wooded and brushy areas, especially near water courses. Species distribution not well known. Potentially suitable habitat is present along the Sacramento River corridor.	Shasta, Sacramento, Feather, Delta, San Joaquin	Low potential for operational changes to affect riparian vegetation used for habitat by this species.
Conservancy Fairy Shrimp	*Branchinecta conservatio*	E/--/--	Large vernal pools and seasonal wetlands, ~ 1 acre in size. Known to occur in suitable habitat on the San Luis NWR complex, Eastside Bypass, and along the San Joaquin River. Currently found in disjunct and fragmented habitats across the Central Valley of California from Tehama County to Merced County and at two Southern California locations on the Los Padres National Forest in Ventura County.	Sacramento, Feather, Yolo, San Joaquin, Delta	Low potential to be affected by restoration activities that influence vernal pools.
Longhorn Fairy Shrimp	*Branchinecta longiantenna*	E/--/--	Vernal pool/seasonal wetlands. Known distribution extends from Contra Costa and Alameda counties to San Luis Obispo County and also includes Merced County. Within this geographic range, it is extremely rare in vernal pools and swales. Known to occur in suitable habitat on the San Luis NWR complex.	Delta, San Joaquin	Low potential to be affected by restoration activities that influence vernal pools.
Vernal Pool Fairy Shrimp	*Branchinecta lynchi*	T/--/--	Typically inhabits vernal pools and seasonal wetlands less than 200 m^2 and less than 5 cm deep; may also occur in larger, deeper pools. Known to occur in suitable habitat on the San Luis NWR.	Sacramento, Feather, Yolo, American, Delta, San Joaquin	Low potential to be affected by restoration activities that influence vernal pools.
Black Tern	*Childonias niger*	--/--/SSC	Nests in freshwater marsh, forages for fish and insects in open water, rice fields, and marsh. Uncommon visitor in suitable habitat in the area of analysis; expected during the nonbreeding season along the San Joaquin River.	Sacramento, Feather, Yolo, San Joaquin, Delta	Low potential to be affected by restoration or changes in acreage of irrigated agriculture and cropping patterns.

Common Name	Scientific Name	Status Federal/State/ CDFW*	Habitat/Distribution	Areas with Potential for Occurrence	Impact Potential
Yellow Warbler (nesting)	*Dendroica petechia brewsteri*	BCC/--/SSC	Nests in riparian woodland and riparian scrub habitats. Forages in a variety of wooded and shrub habitats during migration. Reclamation (2010) concluded this species occurs near New Melones Reservoir. No recent nesting records, but potential nesting habitat present; known to occur during migration in suitable habitat on the San Luis NWR. Could nest and forage in the upper Sacramento River area. Likely to use riparian woodlands during migration.	Trinity, Clear Creek, Shasta, Sacramento, Feather, New Melones, San Joaquin	Low potential to be affected by operational flow changes that influence riparian vegetation.
White-tailed Kite (nesting)	*Elanus leucurus*	--/--/FP	Nests in woodlands and isolated trees; forages in grasslands, shrub lands and agricultural fields. Common to uncommon and a year-round resident in the Central Valley, in other lowland valleys, and along the entire length of the coast. Recent surveys in Yolo and Sacramento counties have documented active nest sites in riparian habitats in the Yolo Bypass and along Steamboat and Georgiana sloughs and along the Sacramento River. Suitable nesting and foraging habitat is present along the upper Sacramento River. Expected to occur in suitable habitat along San Joaquin River and in Yolo Bypass.	Shasta, Sacramento, Feather, Yolo, American, San Joaquin, Delta, San Luis	Low potential to be impacted by restoration actions in Yolo Bypass or operational changes that influence riparian vegetation.
Delta Green Ground Beetle	*Elaphrus viridis*	T/--/--	Associated with vernal pool habitats, seasonally wet pools that accumulate in low areas with poor drainage, which occur throughout the Central Valley. Presently known to occur only in Solano County northeast of the San Francisco Bay Area.	Delta	Low potential to be affected by restoration activities that influence vernal pools.
Western Pond Turtle	*Emmys marmorata*	--/--/SSC	Inhabits slow-moving streams, sloughs, ponds, irrigation and drainage ditches, and adjacent upland areas. Potentially occurs near New Melones Reservoir. Recorded within Whiskeytown Lake and Clear Creek and near Lewiston Reservoir. Known to occur in suitable habitat on the San Luis NWR complex, in the Mendota Wildlife Area, and at Mendota Pool; expected to occur in suitable habitat in other locations in the San Joaquin River Restoration Area.	Trinity, Shasta, Sacramento, Feather, American, San Joaquin, Stanislaus, Delta, San Luis	Low potential to be affected by operational changes at reservoirs or irrigation canals and storage facilities.
Saltmarsh Common Yellowthroat	*Geothlypis trichas sinuosa*	BCC/--/SSC	Primarily brackish marsh, but also brackish and fresh woody swamps and riparian areas. Ranges generally in the San Francisco Bay area.	Delta, Suisun	Low potential to be affected by tidal marsh restoration.
Least Bittern (nesting)	*Ixobrychus exilis*	BCC/--/SSC	Rare to uncommon April to September nester in large, fresh emergent wetlands of cattails and tules in the Sacramento and San Joaquin valleys. Occurs in fresh water marsh habitats in the Yolo Bypass, east of the Sacramento River, and in the western Delta. Uncommon but regular breeder in suitable habitat in the San Joaquin Valley.	Sacramento, Feather, Yolo, Delta, San Joaquin	Low potential to be affected by restoration.
Vernal Pool Tadpole Shrimp	*Lepidurus packardi*	E/--/--	Vernal pool/seasonal wetlands. Endemic to the Central Valley, with most populations located in the Sacramento Valley. This species has also been reported from the Delta to the east side of San Francisco Bay. Known to occur in suitable habitat on the San Luis NWR complex and at the Great Valley Grasslands State Park.	Sacramento, Feather, Yolo, Delta, San Joaquin	Low potential to be affected by restoration activities that influence vernal pools.
Suisun Song Sparrow	*Melospiza melodia maxillaris*	BCC/--/SSC	Brackish marshes around Suisun Bay.	Suisun, Delta	Low potential to be affected by tidal marsh restoration activities.
Riparian (= San Joaquin Valley) Woodrat	*Neotoma fuscipes riparia*	E/--/SSC	Historically found in riparian habitat along the San Joaquin, Stanislaus, and Tuolumne rivers. Now known only from Caswell Memorial State Park on the Stanislaus River near its confluence with the San Joaquin River in very low gradient portion of river. No actions proposed that could affect this species in this area. Last reported at Caswell Memorial State Park in 2002. Likely still extant.	Delta, Stanislaus, San Joaquin	Low potential to be affected by changes in operation that influence riparian vegetation.
Osprey (nesting)	*Pandion haliaetus*	--/--/WL	Nests on platform of sticks at the top of large snags, dead-topped trees, on cliffs, or on human-made structures. Requires open, clear waters for foraging. Uses rivers, lakes, reservoirs, bays, estuaries, and surf zones. Reclamation (2010) concluded this species occurs near New Melones Reservoir. Known to nest along the Sacramento River.	Trinity, Clear Creek, Shasta, Sacramento, Feather, Yolo, American, New Melones	Low potential for foraging behavior to be affected by changes in reservoir levels.
White-faced Ibis (nesting colony)	*Plegadis chihi*	--/--/WL	Forages in wetlands and irrigated or flooded croplands and pastures. Breeds colonially in dense freshwater marsh. Known to occur in suitable habitat on the San Luis NWR complex and other sites in the Restoration Area and Yolo Bypass.	Feather, Yolo, American, San Joaquin	Low potential for restoration actions to affect nesting colonies in the Yolo Bypass.

Common Name	Scientific Name	Status Federal/State/ CDFW*	Habitat/Distribution	Areas with Potential for Occurrence	Impact Potential
Suisun Shrew	*Sorex ornatus sinuosus*	--/--/SSC	Historically known from tidal wetlands of Solano, Napa, and eastern Sonoma counties. Currently limited to the northern borders of San Pablo and Suisun bays.	Suisun	Low potential to be affected by tidal wetland restoration activities.
Riparian Brush Rabbit	*Sylvilagus bachmani riparius*	E/E/--	Historical distribution may have extended along portions of the San Joaquin River and its tributaries on the valley floor from at least Stanislaus County to the Delta. Currently restricted to several populations at Caswell Memorial State Park, near Manteca in San Joaquin County, along the Stanislaus River, along Paradise Cut (a channel of the San Joaquin River in the southern part of the Delta), and a recent reintroduction on private lands adjacent to the San Joaquin River NWR.	Delta, Stanislaus, San Joaquin	Low potential to be affected by changes in flows that inundate suitable habitat along the San Joaquin River.
Least Bell's Vireo (nesting)	*Vireo bellii pusillus*	E/E/--	Nests in dense, low, shrubby vegetation, generally early successional stages in riparian areas, particularly cottonwood-willow forest, but also brushy fields, young second-growth forest or woodland, scrub oak, coastal chaparral, and mesquite brush lands, often near water in arid regions. Observed in Yolo Bypass Wildlife Area. Successfully nested at the San Joaquin River NWR in 2005 and 2006.	Sacramento, Yolo, Delta, San Joaquin	Low potential to be affected by changes in flow that influence adjacent riparian vegetation.

Notes:
***Status Codes:**
BCC = Bird Species of Conservation Concern
BLM = Bureau of Land Management Sensitive Species
C = Candidate
E = Endangered
FP = California Fully Protected
FS = Forest Service Sensitive Species
PT = Proposed Threatened
SSC = California Species of Special Concern
T = Threatened
WL = CDFW Watch List

BDCP = Bay Delta Conservation Plan
CDFW = California Department of Fish and Wildlife
cm = centimeters
m^2 = square meters
NWR = National Wildlife Refuge

Table 10A.2 Special-Status Plant Species

Common Name	Scientific Name	Status Federal/State/ CRPR*	Habitat/Distribution	Areas with Potential for Occurrence	Impact Potential
Bogg's Lake Hedge-hyssop	*Gratiola heterosepala*	--/E/1B.2	Marshy and swampy lake margins, vernal pools. Known from north Delta and from the Sacramento and San Joaquin valleys. CNDDB documents occurrences at Jepson Prairie, the Rio Linda area, and Mather County Park.	Sacramento, Yolo, Delta, San Joaquin	Low potential to be affected by restoration actions that influence vernal pools.
Bolander's Water Hemlock	*Cicuta maculata* var. *bolanderi*	--/--/2.1	Coastal fresh or brackish marshes and swamps in Contra Costa, Sacramento, Marin, and Solano counties. Present at north and central Delta and Suisun Marsh.	Sacramento, Delta, Suisun Marsh	Low potential to be affected by tidal marsh restoration actions.
Delta Button-celery	*Eryngium racemosum*	--/E/1B.1	Vernally mesic clay depressions in riparian scrub. Extant occurrences recorded along San Joaquin River in Merced County, and in south Delta. Reclamation (2010) concluded this species could potentially occur near New Melones Reservoir.	Delta, Stanislaus, New Melones, San Joaquin	Low potential to be affected by changes in flood inundation and reservoir elevation.
Delta Tule Pea	*Lathyrus jepsonii* var. *jepsonii*	--/--/1B.2	Freshwater and brackish marshes and swamps in the Delta region. Known from north, central, and west Delta, and Suisun Marsh. CNDDB documents occurrences at Snodgrass, Barker, Lindsey, Hass, and Cache sloughs, Delta Meadows Park, and Calhoun Cut.	Yolo, Delta	Low potential to be affected by restoration of tidal marsh.
Mason's Lilaeopsis	*Lilaeopsis masonii*	--/R/1B.1	Brackish or freshwater marshes and swamps, riparian scrub in Delta region. Known and locally common in certain regions of Delta and in Suisun Marsh. CNDDB documents occurrences of this species in Barker, Lindsey, Cache, and Snodgrass sloughs as well as in Calhoun Cut.	Delta, Suisun Marsh	Low potential to be affected by tidal restoration.
Suisun Marsh Aster	*Symphyotrichum lentum*	--/--/1B.2	Endemic to Delta, generally occurs in marshes and swamps, often along sloughs, from 0 to 3 meters in elevation. Brackish and freshwater marshes and swamps in Bay-Delta region. Known from many areas of Delta and from Suisun Marsh	Yolo, Delta, Suisun Marsh	Low potential to be affected by tidal marsh restoration.
Suisun Thistle	*Cirsium hydrophilum* var. *hydrophilum*	E/--/1B.1	Salt marshes and swamps. Two known occurrences in Grizzly Island Wildlife Area and Peytonia Slough Ecological Reserve. Present at Suisun Marsh.	Delta, Suisun Marsh	Low potential to be affected by tidal marsh restoration.
Soft Bird's-beak	*Chloropyron molle* ssp. *molle*	E/R/1B.2	Coastal salt marshes and swamps in Contra Costa, Napa, and Solano counties.	Delta	Low potential to be affected by tidal marsh restoration.

Notes:

*** Status Codes:**

E = Endangered
R = Rare
SC = Species of Concern
T = Threatened

CRPR Codes:

1A = Plants presumed to be extinct in California
1B = Plants that are rare, threatened, or endangered in California and elsewhere
2 = Plants that are rare, threatened, or endangered in California but more common elsewhere

CRPR Threat Ranks:

1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
2 = Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
3 = Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

CNDDB= California Natural Diversity Database
CRPR = California Rare Plant Ranks

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Appendix 12A

Statewide Agricultural Production Model (SWAP) Documentation

This appendix provides information about the Statewide Agricultural Production (SWAP) model methodology, assumptions, and results used for the Remanded Biological Opinions on Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS) Environmental Consequences analysis. More comprehensive SWAP model documentation can be found in the reference list, Section 12A.4.

This appendix is organized into three main sections:

- Section 12A.1: SWAP Model Methodology. The EIS uses SWAP to quantify effects of the alternatives on the long-term operations. This section provides information about the development history, methodology, and coverage.
- Section 12A.2: SWAP Model Assumptions. This section provides a brief description of the assumptions for the SWAP model simulations of the No Action Alternative, Second Basis of Comparison, and the other EIS alternatives.
- Section 12A.3: SWAP Model Results. This section provides model results used in the analysis and interpretation of modeling results for the alternatives impacts assessment. Also included is a discussion of model outputs used by other tools.

12A.1 SWAP Model Methodology

This section summarizes the SWAP development history, methodology, and coverage. It describes the overall analytical framework and contains descriptions of the key sources of input data used in the quantitative evaluation of the alternatives. The project alternatives include several major components that will have significant effects on CVP and SWP operations and the quantity of delivered water to agricultural contractors.

The SWAP model is a regional agricultural production and economic optimization model that simulates the decisions of farmers across 93 percent of agricultural land in California. It is the most current in a series of production models of California agriculture developed by researchers at the University of California at Davis under the direction of Professor Richard Howitt in collaboration with the California Department of Water Resources (DWR). The SWAP model has been subject to peer review and technical details can be found in “Calibrating Disaggregate Economic Models of Irrigated Production and Water Management” (Howitt et al. 2012).

12A.1.1 SWAP Model Development History

The SWAP model is an improvement and extension of the Central Valley Production Model (CVPM). The CVPM was developed in the early 1990s and was used to assess the impacts of the Central Valley Project Improvement Act (Reclamation and USFWS 1999). The SWAP model allows for greater flexibility in production technology and input substitution than CVPM does, and has been extended to allow for a range of analyses, including interregional water transfers and climate change effects. Its first application was to estimate the economic scarcity costs of water for agriculture in the statewide hydro-economic optimization model for water management in California, CALVIN (Draper et al. 2003). More recently, the SWAP model has been used to estimate the economic losses caused by salinity in the Central Valley (Howitt et al. 2009a), economic losses to agriculture in the Sacramento-San Joaquin Delta (Lund et al. 2007), and economic effects of water shortage to Central Valley agriculture (Howitt et al. 2009b). The model was updated and augmented for use by Bureau of Reclamation (Reclamation) in 2012 (Reclamation 2012). It is also being used in several ongoing studies of water projects and operations.

12A.1.1.1 Modeling Objectives

EIS modeling objectives accomplished with the SWAP model included the evaluation of the following potential impacts:

- Effects on irrigated agricultural acreage
- Effects on total production value
- Qualitative effects related to water transfers

12A.1.2 SWAP Model Methodology

The SWAP model assumes that growers select the crops, water supplies, and other inputs to maximize profit subject to resource constraints, technical production relationships, and market conditions. Growers face competitive markets, where no one grower can influence crop prices. The competitive market is simulated by maximizing the sum of consumer and producer surplus subject to the following characteristics of production, market conditions, and available resources:

- Constant Elasticity of Substitution (CES) production functions for every crop in every region. CES has four inputs: land, labor, water, and other supplies. CES production functions allow for limited substitution between inputs, which allows the model to estimate both total input use and input use intensity. Parameters are calculated using a combination of prior information and the method of Positive Mathematical Programming (PMP) (Howitt 1995a, Howitt 1995b).
- Marginal land cost functions are estimated using PMP. Additional land brought into production is assumed to be of lower value and thus requires a higher cost to cultivate. The PMP functions capture this cost by using acreage response elasticities, which relate change in acreage to changes in expected returns and other information.

- Groundwater pumping cost including depth to groundwater.
- Crop demand functions.
- Resource constraints on land, labor, water, and, if applicable, other input availability by region.
- Other agronomic and economic constraints. For example, a minimum regional silage production to meet dairy herd feeding requirements can be imposed if appropriate.

The model chooses the optimal amounts of land, water, labor, and other input use subject to these constraints and definitions. Profit is revenue minus costs, where revenue is price times yield per acre times total acres. Trade-offs among production inputs are described by the CES production functions. Costs are observable input costs plus the PMP cost function, which represents changes in marginal productivity of land. Downward-sloping crop demand curves guarantee that with all else constant, as production increases, crop price decreases (and vice-versa). Over time, crop demands may shift, driven by real income growth and population increases. External data and elasticities are used to estimate the magnitude of these shifts.

The SWAP model incorporates CVP and SWP agricultural water supplies, other local surface water supplies, and groundwater. As conditions change within a SWAP region (e.g., the quantity of available project water supply increases or the cost of groundwater pumping increases), the model optimizes production by adjusting the crop mix, water sources and quantities used, and other inputs. Land will be fallowed when that is the most cost-effective response to resource conditions.

The SWAP model is used to compare the long-run response of agriculture to potential changes in CVP and SWP agricultural water delivery, other surface or groundwater conditions, or other economic values or restrictions. Results from the CalSim II model are used as inputs into SWAP through a standardized data linkage tool, as described in Appendix 5A, CalSim II and DSM2 Modeling. Groundwater analysis conducted for the EIS with the Central Valley Hydrologic Model is used to develop assumptions and estimates on pumping lifts for use in the SWAP model. See Appendix 7A, Groundwater Model Documentation, for more information on the interfacing of the Central Valley Hydrologic Model and SWAP.

The model self-calibrates using PMP, which has been used in models since the 1980s (Vaux and Howitt 1984) and was formalized in 1995 (Howitt 1995a). PMP allows the modeler to infer the marginal cost and return conditions affecting decisions of farmers while only being able to observe limited average production cost and return data. PMP captures this information through a nonlinear cost or revenue function introduced to the model.

12A.1.3 SWAP Model Coverage

The SWAP model has 27 base regions in the Central Valley. The model is also able to include agricultural areas of the Central Coast, the Colorado River region that includes Coachella, Palo Verde and the Imperial Valley, and San Diego, Santa Ana, and Ventura and the South Coast; however, data for those regions have not been updated recently, so those regions were not analyzed for this report using SWAP. Figure 12A.1 shows the numbered California agricultural areas covered in SWAP. Table 12A.1 details the major water users in each of the regions.

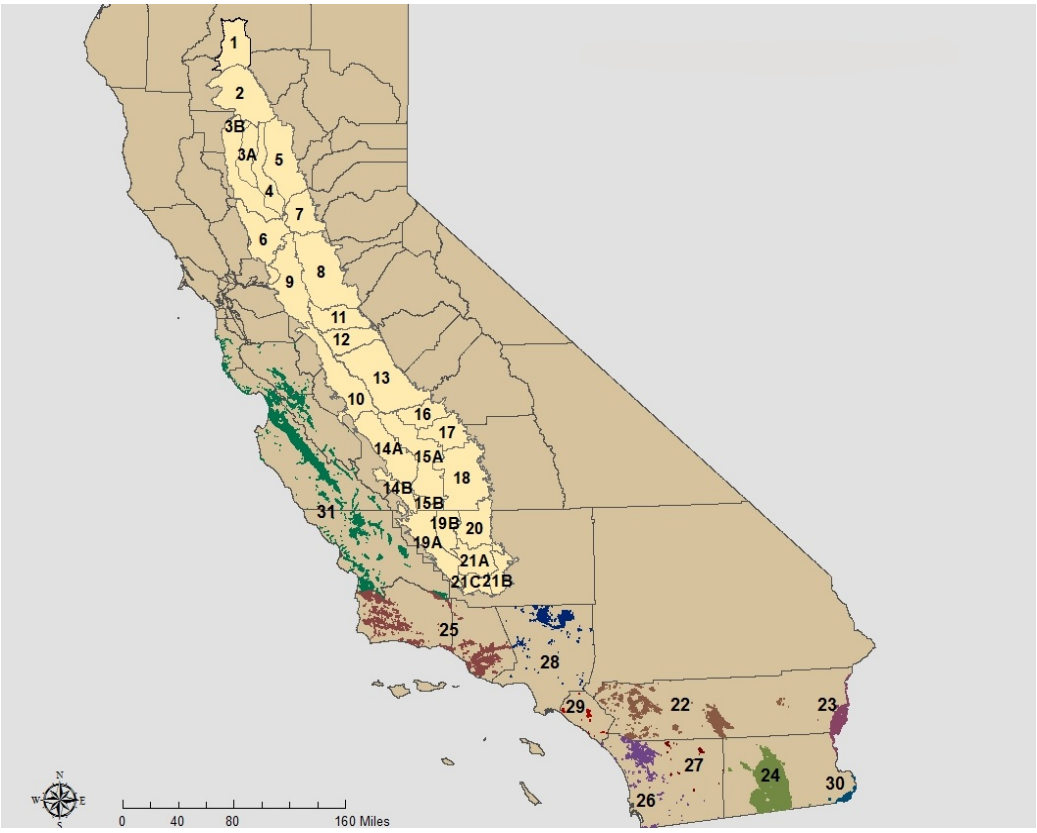

Figure 12A.1 SWAP Model Coverage of Agriculture in California

Table 12A.1 SWAP Model Region Summary

SWAP Region	Major Surface Water Users
1	CVP Users: Anderson Cottonwood I.D., Clear Creek C.S.D., Bella Vista W.D., and other Sacramento River Water Rights Settlement Contractors.
2	CVP Users: Corning Canal, Kirkwood W.D., Tehama, and other Sacramento River Water Rights Settlement Contractors.
3a	CVP Users: Glenn Colusa I.D., Provident I.D., Princeton-Codora I.D., Maxwell I.D., and Colusa Basin Drain M.W.C.
3b	Tehama Colusa Canal Service Area. CVP Users: Orland-Artois W.D., most of Colusa County, Davis W.D., Dunnigan W.D., Glide W.D., Kanawha W.D., La Grande W.D., and Westside W.D.
4	CVP Users: Princeton-Codora-Glenn I.D., Colusa I.C., Meridian Farm W.C., Pelger Mutual W.C., Reclamation District 1004, Reclamation District 108, Roberts Ditch I.C., Sartain M.D., Sutter M.W.C., Swinford Tract I.C., Tisdale Irrigation and Drainage Company, and other Sacramento River Water Rights Settlement Contractors.
5	Most Feather River Region riparian and appropriative users.
6	Yolo and Solano Counties. CVP Users: Conaway Ranch and other Sacramento River Water Rights Settlement Contractors.
7	Sacramento County north of American River. CVP Users: Natomas Central M.W.C., other Sacramento River Water Rights Settlement Contractors, Pleasant Grove-Verona W.M.C., and Placer County Water Agency.
8	Sacramento County south of American River and northern San Joaquin County.
9	Direct diverters within the Delta region. CVP Users: Banta Carbona I.D., West Side W.D., and Plainview W.D.
10	Delta Mendota service area. CVP Users: Panoche W.D., Pacheco W.D., Del Puerto W.D., Hospital W.D., Sunflower W.D., West Stanislaus W.D., Mustang W.D., Orestimba W.D., Patterson W.D., Foothill W.D., San Luis W.D., Broadview W.D., Eagle Field W.D., Mercy Springs W.D., San Joaquin River Exchange Contractors.
11	Stanislaus River water rights: Modesto I.D., Oakdale I.D., and South San Joaquin I.D.
12	Turlock I.D.
13	Merced I.D. CVP Users: Madera I.D., Chowchilla W.D., and Gravelly Ford W.D.
14a	CVP Users: Westlands W.D.
14b	Southwest corner of Kings County.
15a	Tulare Lake Bed. CVP Users: Fresno Slough W.D., James I.D., Tranquillity I.D., Traction Ranch, Laguna W.D., and Reclamation District 1606.
15b	Dudley Ridge W.D. and Devil's Den W.D. (Castaic Lake).

SWAP Region	Major Surface Water Users
16	Eastern Fresno County. CVP Users: Friant-Kern Canal Water Authority, Fresno I.D., Garfield W.D., and International W.D.
17	CVP Users: Friant-Kern Canal, Hills Valley I.D., Tri-Valley W.D., and Orange Cove I.D.
18	CVP Users: Friant-Kern Canal, County of Fresno, Lower Tule River I.D., Pixley I.D., portion of Rag Gulch W.D., Ducor I.D., County of Tulare, most of Delano-Earlimart I.D., Exeter I.D., Ivanhoe I.D., Lewis Creek W.D., Lindmore I.D., Lindsay-Strathmore I.D., Porterville I.D., Sausalito I.D., Stone Corral I.D., Tea Pot Dome W.D., Terra Bella I.D., and Tulare I.D.
19a	SWP Service Area, including Belridge W.S.D., Berrenda Mesa W.D.
19b	SWP Service Area, including Semitropic W.S.D.
20	CVP Users: Friant-Kern Canal Water Authority, Shafter-Wasco I.D.
21a	CVP Users: Cross Valley Canal water users and Friant-Kern Canal Water Authority.
21b	Arvin Edison W.D.
21c	SWP service area: Wheeler Ridge-Maricopa W.S.D.
23-30	Central Coast, Desert, and Southern California.

Notes:

The list above does not include all water users. It is intended only to indicate the major users or categories of users. All regions in the Central Valley also include private groundwater pumpers.

C.S.D. = Community Service District
I.C. = Irrigation Company
I.D. = Irrigation District
M.W.C. = Mutual Water Company
W.D. = Water District
W.S.D. = Water Storage District

Crops are aggregated into 20 crop groups, which are the same across all regions. Each crop group may represent a number of individual crops, but many are dominated by a single crop. Irrigated acres represent acreage of all crops within the group, while production costs and returns are represented by a single proxy crop for each group. The current 20 crop groups were defined in collaboration with Reclamation and DWR and updated in March 2011. For each group, the representative (proxy) crop is chosen based on four criteria:

- A detailed production budget is available from the University of California Cooperative Extension (UCCE).
- It is the largest or one of the largest acreages within a group.
- Its water use (applied water) is representative of water use of the crops in the group.
- Its gross and net returns per acre are representative of the crops in the group.

The relative importance of these criteria varies by crop. Crop group definitions and the corresponding proxy crop are shown in Table 12A.2.

Table 12A.2 SWAP Model Crop Groups

SWAP Definition	Proxy Crop	Other Crops
Almonds and Pistachios	Almonds	Pistachios
Alfalfa	Alfalfa hay	–
Corn	Grain corn	Corn silage
Cotton	Pima cotton	Upland cotton
Cucurbits	Summer squash	Melons, cucumbers, pumpkins
Dry Beans	Dry beans	Lima beans
Fresh Tomatoes	Fresh tomatoes	–
Grain	Wheat	Oats, sorghum, barley
Onions and Garlic	Dry onions	Fresh onions, garlic
Other Deciduous	Walnuts	Peaches, plums, apples
Other Field	Sudan grass hay	Other silage
Other Truck	Broccoli	Carrots, peppers, lettuce, other vegetables
Pasture	Irrigated pasture	–
Potatoes	White potatoes	–
Processing Tomatoes	Processing tomatoes	–
Rice	Rice	–
Safflower	Safflower	–
Sugar Beet	Sugar beets	–
Subtropical	Oranges	Lemons, misc. citrus, olives
Vine	Wine grapes	Table grapes, raisins

12A.2 SWAP Model Assumptions

This section is a non-technical overview of the SWAP model. It is important to note that SWAP, like any model, is a representation of a complex system and requires assumptions and simplifications to be made. All analyses using SWAP should be explicit about the assumptions and provide sensitivity analysis where appropriate.

12A.2.1 Calibration Using Positive Mathematical Programming

The SWAP model self-calibrates using a three-step procedure based on PMP (Howitt 1995a) and the assumption that farmers behave as profit-maximizing agents within a competitive market. In a traditional optimization model, profit-maximizing farmers would simply allocate all land, up until resource constraints become binding, to the most valuable crop(s). In other words, a traditional model would have a tendency for overspecialization in production activities relative to what is observed empirically. PMP incorporates information on the marginal production conditions that farmers face, allowing the model to replicate a base year of observed input use and output. Farm- and field-specific conditions that are unobserved in aggregated data may include inter-temporal effects of crop rotation, proximity to processing facilities, management skills, farm-level effects such as risk and input smoothing, and heterogeneity in soil and other physical capital. In the SWAP model, PMP is used to translate these unobservable marginal conditions, in addition to observed average conditions, into an exponential "PMP" cost function. This cost function allows the model to calibrate to a base year of observed input use and output.

The SWAP model assumes additional land brought into production faces an increasing marginal cost of production. The most fertile or lowest cost land is cultivated first; additional land brought into production is of lower "quality" because of poorer soil quality, drainage or other water quality issues, or other factors that cause it to be more costly to farm. This is captured through an exponential land cost function (PMP cost function) for each crop and region. The exponential function is advantageous because it is always positive and strictly increasing, consistent with the hypothesis of increasing land costs. The PMP cost function is both region- and crop-specific, reflecting differences in production across crops and heterogeneity across regions. Functions are calibrated using information from acreage response elasticities and shadow values of calibration and resource constraints. The information is incorporated in such a way that the average cost conditions (the observed cost data) are unaffected.

12A.2.2 Constant Elasticity of Substitution Production Function

Crop production in the SWAP model is represented by a CES production function for each region and crop with positive acres. In general, a production function captures the relationship between inputs and output. For example, land, labor, water, and other inputs are combined to produce a crop. CES production functions in the SWAP model are specific to each region; thus, regional input use is combined to determine regional production for each crop. The calibration routine in SWAP guarantees that both input use and output match a base year of observed data.

The SWAP model considers four aggregate inputs to produce each crop in each region: land, labor, water, and other supplies. All units are converted into monetary terms, e.g., dollars of labor per acre instead of worker hours. Land is simply the number of acres of a crop in any region. Land costs represent basic land investment, cash overhead, and (when applicable) land rent. Labor costs represent both machinery labor and manual labor. "Other supplies" is a broad

category that captures a range of inputs including fertilizer, pesticides, chemicals, capital recovery, and interest on operating capital. Water costs and use per acre vary by crop and region.

The generalized CES production function allows for limited substitution among inputs (Beattie and Taylor 1985). This is consistent with observed farmer production practices (farmers are able to substitute among inputs in order to achieve the same level of production). For example, farmers may substitute labor for chemicals by reducing herbicide application and increasing manual weed control. Or, farmers can substitute labor for water by managing an existing irrigation system more intensively in order to reduce water use. The CES function used in Version 6 of the SWAP model is non-nested; thus, the elasticity of substitution is the same between all inputs.

12A.2.3 Crop Demand Functions

The SWAP model is specified with downward-sloping, California-specific crop demand functions. The demand curve represents consumers' willingness-to-pay for a given level of crop production. With all else constant, as production of a crop increases, the price of that crop is expected to fall. The extent of the price decrease depends on the elasticity of demand or, equivalently, the price flexibility, which is the percentage change in crop price due to a percent change in production. Demand functions are specific to a crop but not to a region. Therefore, large changes in production in one set of regions can, through the demand-induced price changes, lead to changes in production in other regions.

The SWAP model is specified with linear demand functions. The nature of the demand function for specific commodities can change over time due to tastes and preferences, population growth, changes in income, and other factors. The SWAP model incorporates linear shifts in the demand functions over time due to growth in population and changes in real income per capita. Changes in the demand elasticity itself, resulting from changing tastes and preferences, are not considered in the model, though they can be evaluated by changing demand function parameters in the model's input data.

12A.2.4 Water Supply and Groundwater Pumping

Total available water for agriculture is specified on a regional basis in the SWAP model. Each region has six sources of supply, although not all sources are available in every region:

- CVP water service contracts (including Friant-Kern Class 1 water service contracts)
- CVP Sacramento River settlement contracts and San Joaquin River exchange contracts
- Friant Kern Class 2 water service contracts
- SWP entitlement contracts
- Other local surface water

- Groundwater

Data sources and associated calculations are described in Reclamation (2012). State and Federal project deliveries are estimated from delivery records of DWR and Reclamation. Local surface water supplies are based on DWR estimates and reports of individual water suppliers, and, where necessary, are drawn from earlier studies.

Costs for surface water supplies are compiled from information published by individual water supply agencies. There is no central data source for water prices in California. Agencies that prepared CVP water conservation plans or agricultural water management plans in most cases included water prices and related fees charged to growers. Other agencies publish and/or announce rates on an annual basis. Water prices used in SWAP are intended to be representative for each region, but vary in their level of detail.

Groundwater availability is specified by region-specific maximum pumping estimates. These are determined by consulting the individual districts' records and information compiled by DWR. DWR analysts provided estimates of the actual pumping in the base year and the existing pumping capacity by region. The model determines the optimal level of groundwater pumping for each region, up to the capacity limit specified. In some studies using SWAP or CVPM, the model has been used interactively with a groundwater model to evaluate short-term and long-term effects on aquifer conditions and pumping lifts.

Pumping costs vary by region depending on depth to groundwater and power rates. The SWAP model includes a routine to calculate the total costs of groundwater. The total cost of groundwater is the sum of fixed, operation and maintenance (O&M), and energy costs. Energy costs are based on a blend of agricultural power rates provided by Pacific Gas and Electric Company (PG&E).

12A.2.5 SWAP Model Inputs and Supporting Data

Land use data in the SWAP model correspond to the year 2010 and were prepared by DWR analysts. DWR is now developing more detailed annual time series data on agricultural land use, but the current version of the SWAP model calibrates to 2010 as a relatively normal base year. All prices and costs in SWAP are in constant 2010 dollars for consistency with the land use data. Table 12A.3 summarizes input data and sources used in the SWAP model.

Table 12A.3 SWAP Model Input Data Summary

Input	Source	Notes
Land Use	DWR	Base year 2010.
Crop Prices	County agricultural commissioners	By proxy crop using 2010-2012 average prices, indexed to 2010 price level.
Crop Yields	UCCE crop budgets	By proxy crop for various years (most recent available).

Input	Source	Notes
Interest Rates	UCCE crop budgets	Crop budget interest costs adjusted to year 2010.
Land Costs	UCCE crop budgets	By proxy crop for various years (most recent available). In 2010 dollars.
Other Supply Costs	UCCE crop budgets	By proxy crop for various years (most recent available). In 2010 dollars
Labor Costs	UCCE crop budgets	By proxy crop for various years (most recent available). In 2010 dollars
Surface Water Costs	Reclamation, DWR, individual districts	By SWAP model region. In 2010 dollars.
Groundwater Costs	PG&E, individual districts	Total cost per acre-foot includes fixed, O&M, and energy cost. In 2010 dollars.
Irrigation Water	DWR	Average crop irrigation water requirements in acre-feet per acre.
Available Water	CVPM, DWR, Reclamation, individual districts	By SWAP model region and water supply source.
Elasticities	Russo et al. 2008	California estimates.

12A.2.6 2030 Assumptions

Analysis of alternatives assumed 2030 conditions. Projected CVP and SWP water deliveries were provided by CalSim II results as described in Appendix 5A, CalSim II and DSM2 Modeling. Future crop demand functions are based on shifts over time due to growth in population and changes in real income per capita (see Section 12A.2.3).

12A.3 SWAP Model Results

12A.3.1 Acreage and Agricultural Production Results

Modeling results are summarized and discussed in Chapter 12, Agricultural Resources. More detailed results by individual crop type are shown in Tables 12A.4 through 12A.11. All values of production are in 2010 dollars.

Table 12A.4 Sacramento and San Joaquin Valley Irrigated Acreage by Crop under the No Action Alternative and Alternative 2 over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (1000s acres)	Long-term Average, San Joaquin Valley (1000s acres)	Dry and Critically Dry, Sacramento Valley (1000s acres)	Dry and Critically Dry, San Joaquin Valley (1000s acres)
Alfalfa	97.2	572.0	96.4	571.5
Almond, Pistachio	164.3	920.3	163.4	918.6
Corn	48.7	678.7	48.3	678.3
Cotton	3.3	281.2	3.3	281.0
Cucurbits	40.1	68.8	40.1	68.8
Drybeans	19.9	55.9	19.9	55.9
Fresh Tomato	1.7	35.1	1.7	35.1
Grain	86.6	289.0	86.8	275.8
Onion, Garlic	4.0	60.4	4.0	60.4
Other Deciduous	246.6	392.6	246.6	392.4
Other Field	44.8	519.5	44.7	519.3
Other Truck	7.4	199.1	7.4	199.1
Pasture, Irrigated	102.0	162.7	100.3	163.0
Potato	–	16.9	–	16.9
Process Tomato	65.5	252.9	65.4	252.9
Rice	548.0	16.6	544.2	16.6
Safflower	11.0	26.5	11.0	26.5
Sugarbeet	–	0.6	–	0.6
Subtropical	37.2	238.5	37.2	238.5
Vineyard	8.4	604.1	8.4	604.1
Total	1,536.7	5,391.7	1,529.0	5,375.3

Table 12A.5 Sacramento and San Joaquin Valley Production Value by Crop under the No Action Alternative and Alternative 2, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Alfalfa	$161.7	$1,256.0	$160.6	$1,255.9
Almond, Pistachio	$737.9	$4,826.8	$737.4	$4,823.5
Corn	$60.6	$979.9	$60.3	$979.1
Cotton	$8.2	$697.1	$8.2	$696.7
Cucurbits	$593.8	$1,018.3	$593.8	$1,018.2
Drybeans	$23.9	$63.5	$23.9	$63.5
Fresh Tomato	$16.5	$404.8	$16.5	$404.8
Grain	$59.6	$278.2	$59.8	$265.1
Onion, Garlic	$31.5	$445.7	$31.5	$445.6
Other Deciduous	$1,759.1	$3,237.2	$1,759.1	$3,236.1
Other Field	$58.0	$664.1	$58.0	$663.9
Other Truck	$51.0	$1,459.2	$51.0	$1,459.1
Pasture, Irrigated	$74.7	$116.2	$73.6	$116.7
Potato	$-	$122.2	$-	$122.2
Process Tomato	$237.9	$999.3	$237.9	$999.1
Rice	$1,072.2	$30.3	$1,065.1	$30.3
Safflower	$8.1	$19.6	$8.1	$19.6
Sugarbeet	$-	$1.6	$-	$1.6
Subtropical	$525.1	$3,618.9	$525.1	$3,618.8
Vineyard	$49.6	$4,243.2	$49.8	$4,243.0
Total	$5,529.5	$24,482.1	$5,519.7	$24,462.8

Table 12A.6 Sacramento and San Joaquin Valley Irrigated Acreage by Crop under the Second Basis of Comparison and Alternative 1, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (1000s acres)	Long-term Average, San Joaquin Valley (1000s acres)	Dry and Critically Dry, Sacramento Valley (1000s acres)	Dry and Critically Dry, San Joaquin Valley (1000s acres)
Alfalfa	97.3	572.2	97.2	572.2
Almond, Pistachio	164.4	920.3	164.4	920.3
Corn	48.6	679.0	48.8	678.9
Cotton	3.3	281.2	3.3	281.2
Cucurbits	40.1	68.8	40.1	68.8
Drybeans	19.9	55.9	19.9	55.9
Fresh Tomato	1.7	35.1	1.7	35.1
Grain	85.6	288.8	86.8	288.8
Onion, Garlic	4.0	60.4	4.0	60.4
Other Deciduous	246.6	392.6	246.6	392.6
Other Field	44.8	519.6	44.9	519.5
Other Truck	7.4	199.1	7.4	199.1
Pasture, Irrigated	102.5	162.7	100.8	163.2
Potato	–	16.9	–	16.9
Process Tomato	65.5	252.9	65.5	252.9
Rice	548.5	16.6	548.0	16.6
Safflower	11.0	26.5	11.0	26.5
Sugarbeet	–	0.6	–	0.6
Subtropical	37.2	238.5	37.2	238.5
Vineyard	8.4	604.1	8.4	604.1
Total	1,536.7	5,392.2	1,535.8	5,392.2

Table 12A.7 Sacramento and San Joaquin Valley Production Value by Crop under the Second Basis of Comparison and Alternative 1, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Alfalfa	$162.0	$1,256.1	$161.7	$1,256.2
Almond, Pistachio	$738.8	$4,826.5	$738.9	$4,826.4
Corn	$60.5	$980.3	$60.8	$980.1
Cotton	$8.2	$697.3	$8.2	$697.3
Cucurbits	$593.8	$1,018.2	$593.8	$1,018.2
Drybeans	$23.9	$63.5	$23.9	$63.5
Fresh Tomato	$16.5	$404.8	$16.5	$404.8
Grain	$58.9	$277.9	$59.8	$277.9
Onion, Garlic	$31.5	$445.7	$31.5	$445.7
Other Deciduous	$1,759.1	$3,237.3	$1,759.1	$3,237.3
Other Field	$58.0	$664.3	$58.1	$664.2
Other Truck	$51.0	$1,459.2	$51.0	$1,459.1
Pasture, Irrigated	$75.0	$116.2	$73.9	$116.7
Potato	$-	$122.2	$-	$122.2
Process Tomato	$238.0	$999.2	$238.1	$999.2
Rice	$1,073.1	$30.3	$1,072.1	$30.3
Safflower	$8.1	$19.6	$8.2	$19.6
Sugarbeet	$-	$1.6	$-	$1.6
Subtropical	$525.1	$3,619.0	$525.3	$3,618.8
Vineyard	$49.6	$4,243.3	$49.8	$4,243.1
Total	$5,531.0	$24,482.6	$5,530.6	$24,482.3

Table 12A.8 Sacramento and San Joaquin Valley Irrigated Acreage by Crop under Alternative 3, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (1000s acres)	Long-term Average, San Joaquin Valley (1000s acres)	Dry and Critically Dry, Sacramento Valley (1000s acres)	Dry and Critically Dry, San Joaquin Valley (1000s acres)
Alfalfa	97.3	572.2	96.8	571.6
Almond, Pistachio	164.4	920.3	163.9	918.9
Corn	48.6	679.0	48.6	678.5
Cotton	3.3	281.2	3.3	281.1
Cucurbits	40.1	68.8	40.1	68.8
Drybeans	19.9	55.9	19.9	55.9
Fresh Tomato	1.7	35.1	1.7	35.1
Grain	85.8	288.8	86.6	286.5
Onion, Garlic	4.0	60.4	4.0	60.4
Other Deciduous	246.6	392.6	246.6	392.5
Other Field	44.8	519.6	44.8	519.4
Other Truck	7.4	199.1	7.4	199.1
Pasture, Irrigated	102.5	162.7	100.3	163.1
Potato	–	16.9	–	16.9
Process Tomato	65.5	252.9	65.5	252.9
Rice	548.4	16.6	547.2	16.6
Safflower	11.0	26.5	11.0	26.5
Sugarbeet	–	0.6	–	0.6
Subtropical	37.2	238.5	37.2	238.5
Vineyard	8.4	604.1	8.4	604.1
Total	1,536.7	5,392.0	1,533.2	5,386.9

Table 12A.9 Sacramento and San Joaquin Valley Production Value by Crop under Alternative 3, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Alfalfa	$161.9	$1,256.1	$161.3	$1,255.7
Almond, Pistachio	$738.8	$4,826.5	$739.2	$4,823.1
Corn	$60.5	$980.2	$60.6	$979.4
Cotton	$8.2	$697.3	$8.2	$696.9
Cucurbits	$593.8	$1,018.2	$593.7	$1,018.2
Drybeans	$23.9	$63.5	$23.9	$63.5
Fresh Tomato	$16.5	$404.8	$16.5	$404.8
Grain	$59.1	$278.0	$59.7	$275.9
Onion, Garlic	$31.5	$445.7	$31.5	$445.6
Other Deciduous	$1,759.1	$3,237.3	$1,759.2	$3,236.4
Other Field	$57.9	$664.3	$58.1	$664.0
Other Truck	$51.0	$1,459.2	$51.0	$1,459.1
Pasture, Irrigated	$75.0	$116.2	$73.7	$116.8
Potato	$-	$122.2	$-	$122.2
Process Tomato	$238.0	$999.2	$238.0	$999.1
Rice	$1,072.8	$30.3	$1,070.7	$30.3
Safflower	$8.1	$19.6	$8.1	$19.6
Sugarbeet	$-	$1.6	$-	$1.6
Subtropical	$525.1	$3,618.9	$525.3	$3,618.7
Vineyard	$49.6	$4,243.3	$49.8	$4,243.0
Total	$5,530.7	$24,482.4	$5,528.6	$24,473.7

Table 12A.10 Sacramento and San Joaquin Valley Irrigated Acreage by Crop under Alternative 5, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (1000s acres)	Long-term Average, San Joaquin Valley (1000s acres)	Dry and Critically Dry, Sacramento Valley (1000s acres)	Dry and Critically Dry, San Joaquin Valley (1000s acres)
Alfalfa	97.2	572.0	96.4	571.5
Almond, Pistachio	164.3	920.3	163.4	918.0
Corn	48.7	678.7	48.3	678.2
Cotton	3.3	281.2	3.3	280.9
Cucurbits	40.1	68.8	40.1	68.8
Drybeans	19.9	55.9	19.9	55.9
Fresh Tomato	1.7	35.1	1.7	35.1
Grain	86.6	289.0	86.6	275.7
Onion, Garlic	4.0	60.4	4.0	60.4
Other Deciduous	246.6	392.6	246.6	392.4
Other Field	44.8	519.5	44.7	519.3
Other Truck	7.4	199.1	7.3	199.1
Pasture, Irrigated	102.0	162.7	100.3	163.0
Potato	–	16.9	–	16.9
Process Tomato	65.5	252.9	65.4	252.9
Rice	548.1	16.6	544.3	16.6
Safflower	11.0	26.5	11.0	26.5
Sugarbeet	–	0.6	–	0.6
Subtropical	37.2	238.5	37.2	238.5
Vineyard	8.4	604.1	8.4	604.0
Total	1,536.7	5,391.6	1,529.0	5,374.4

Table 12A.11 Sacramento and San Joaquin Valley Production Value by Crop under Alternative 5, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crops	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Alfalfa	$161.7	$1,255.9	$160.6	$1,255.8
Almond, Pistachio	$738.0	$4,826.7	$737.9	$4,822.0
Corn	$60.6	$979.9	$60.3	$979.0
Cotton	$8.2	$697.1	$8.2	$696.5
Cucurbits	$593.8	$1,018.3	$593.7	$1,018.2
Drybeans	$23.9	$63.5	$23.9	$63.5
Fresh Tomato	$16.5	$404.8	$16.5	$404.8
Grain	$59.6	$278.2	$59.7	$265.1
Onion, Garlic	$31.5	$445.7	$31.5	$445.6
Other Deciduous	$1,759.1	$3,237.2	$1,759.1	$3,235.8
Other Field	$58.0	$664.1	$58.0	$663.8
Other Truck	$51.0	$1,459.2	$51.0	$1,459.0
Pasture, Irrigated	$74.7	$116.2	$73.7	$116.7
Potato	$-	$122.2	$-	$122.2
Process Tomato	$237.9	$999.3	$237.9	$999.1
Rice	$1,072.3	$30.3	$1,065.3	$30.3
Safflower	$8.1	$19.6	$8.1	$19.6
Sugarbeet	$-	$1.6	$-	$1.6
Subtropical	$525.1	$3,618.9	$525.2	$3,618.7
Vineyard	$49.6	$4,243.2	$49.8	$4,243.0
Total	$5,529.6	$24,482.0	$5,520.4	$24,460.2

12A.3.2 Cost of Groundwater Pumping for Irrigation

Table 12A.12 displays the cost of pumping groundwater in 2010 dollars, by region and alternative, for long-term average condition and for dry and critically dry years.

Table 12A.12 Groundwater Pumping Cost by Region and Alternative, over the Long-term Average Conditions and for Dry and Critically Dry Years

Alternative	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically, Sacramento Valley (Million $)	Dry and Critically, San Joaquin Valley (Million $)
No Action Alternative and Alternative 2	$58.3	$882.6	$66.3	$1,029.3
Second Basis of Comparison and Alternative 1	$57.6	$782.9	$66.3	$962.1
Alternative 3	$57.5	$813.0	$66.3	$990.2
Alternative 5	$58.3	$887.1	$66.3	$1,032.8

12A.3.3 Output Data for Use in IMPLAN Model

Production value estimates were summarized into more aggregated crop categories for use in regional economic impact analysis, as described in Chapter 19, Socioeconomics. All values below are in 2010 dollars. Tables 12A.13 through 12A.16 display the aggregated production values. It should be noted that for the IMPLAN analysis, the values were indexed for 2012 dollars.

Table 12A.13 Production Value by Aggregated Crop Category under the No Action Alternative and Alternative 2, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crop Category	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Grains	$1,348	$1,498	$1,340	$1,483
Field Crops	$82	$1,532	$82	$1,531
Forage Crops	$262	$1,521	$260	$1,521
Vegetable, Truck	$1,031	$4,931	$1,031	$4,930
Orchards, Vineyards	$3,404	$17,649	$3,404	$17,644
Total	$6,128	$27,130	$6,117	$27,109

Table 12A.14 Production Value by Aggregated Crop Category under Second Basis of Comparison and Alternative 1, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crop Category	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Grains	$1,348	$1,498	$1,348	$1,498
Field Crops	$82	$1,532	$83	$1,532
Forage Crops	$263	$1,521	$261	$1,521
Vegetable, Truck	$1,031	$4,931	$1,032	$4,931
Orchards, Vineyards	$3,405	$17,649	$3,405	$17,648
Total	$6,129	$27,131	$6,129	$27,131

Table 12A.15 Production Value by Aggregated Crop Category under Alternative 3, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crop Category	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Grains	$1,348	$1,498	$1,346	$1,495
Field Crops	$82	$1,532	$82	$1,532
Forage Crops	$263	$1,521	$260	$1,521
Vegetable, Truck	$1,031	$4,931	$1,031	$4,930
Orchards, Vineyards	$3,405	$17,649	$3,406	$17,643
Total	$6,129	$27,131	$6,127	$27,121

Table 12A.16 Production Value by Aggregated Crop Category under Alternative 5, over the Long-term Average Conditions and for Dry and Critically Dry Years

Crop Category	Long-term Average, Sacramento Valley (Million $)	Long-term Average, San Joaquin Valley (Million $)	Dry and Critically Dry, Sacramento Valley (Million $)	Dry and Critically Dry, San Joaquin Valley (Million $)
Grains	$1,281	$412	$1,273	$398
Field Crops	$150	$2,618	$149	$2,616
Forage Crops	$262	$1,521	$260	$1,521
Vegetable, Truck	$1,031	$4,931	$1,031	$4,930
Orchards, Vineyards	$3,404	$17,649	$3,404	$17,641
Total	$6,128	$27,130	$6,118	$27,106

12A.3.4 Model Limitations and Applicability

The SWAP model is an optimization model that makes the best (most profitable) adjustments to water supply and other changes. Constraints can be imposed to simulate restrictions on how much adjustment is possible or how fast the adjustment can realistically occur. Nevertheless, an optimization model can tend to over-adjust and minimize costs associated with detrimental changes or, similarly, maximize benefits associated with positive changes.

SWAP does not explicitly account for the dynamic nature of agricultural production; it provides a point in time comparison between two conditions. This is consistent with the way most economic and environmental impact analysis is conducted, but it can obscure sometimes important adjustment costs.

SWAP also does not explicitly incorporate risk or risk preferences (e.g., risk aversion) into its objective function. Risk and variability are handled in two ways. First, the calibration procedure for SWAP is designed to reproduce observed crop mix, so to the extent that crop mix incorporates farmers' risk spreading and risk aversion, the starting, calibrated SWAP base condition will also. Second, variability in water delivery, prices, yields, or other parameters can be evaluated by running the model over a sequence of conditions or over a set of conditions that characterize a distribution, such as a set of water year types.

Groundwater is an alternative source to augment local surface, SWP, and CVP water delivery in all SWAP regions. The cost and availability of groundwater therefore has an important effect on how SWAP responds to changes in delivery. However, SWAP is not a groundwater model and does not include any direct way to adjust pumping lifts and unit pumping cost in response to long-run changes in pumping quantities. Economic analysis using SWAP must rely on an accompanying groundwater analysis.

12A.4 References

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Appendix 19A

California Water Economics Spreadsheet Tool (CWEST) Documentation

This appendix provides information about the California Water Economics Spreadsheet Tool (CWEST) methodology, assumptions, and results used for the Coordinated Long Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) Environmental Impact Statement (EIS) Environmental Consequences analysis. The EIS uses CWEST to quantify effects of the alternatives on the economic benefits of deliveries to CVP and SWP Municipal and Industrial (M&I) water users. CWEST was developed for the EIS and this is the first official documentation of the tool.

This appendix is organized into three main sections as follows:

- Section 19A.1: CWEST Methodology
  - This section provides information about the development history, methodology, and coverage.
- Section 19A.2: CWEST Assumptions
  - This section provides information about the overall analytical framework, assumptions, and the input data obtained from publicly available sources. A description of how the No Action Alternative water supplies was formulated is also included.
- Section 19A.3: CWEST Results
  - This section provides a detailed description of the model simulation output format used in the analysis and interpretation of modeling results for the alternatives impacts assessment. Also included is a description of the model outputs used by other model analyses.

19A.1 CWEST Methodology

This section summarizes the CWEST development history, methodology, and coverage. It describes the overall analytical framework and the geographical extent of the economic evaluation of the alternatives. The EIS alternatives include several major components that will have significant effects on CVP and SWP operations and the quantity of delivered water to CVP and SWP M&I water users. CWEST was developed to provide consistent and transparent analysis of economic benefits of CVP and SWP M&I water supplies for CVP contractors and SWP Table A contract holders under 2030 conditions using publicly available information. Most demand data and data on local supply levels are from 2010 Urban Water Management Plans (UWMPs).

CWEST is an economic simulation and optimization tool that represents each individual CVP and SWP M&I water user's decision making. It provides estimates of water supply costs for each water user. The logic and methods are built on those used by other California M&I water economics tools. Similar to the existing California M&I water economics tools, CWEST minimizes the total costs of meeting annual M&I water demands that are subject to constraints. These costs include: conveyance and operations costs, costs of existing and new permanent supplies, transfer or other option costs, costs of local surface and groundwater operations, lost water sales revenues, and end-user shortage costs. The level of demand, quantity and type of local water supplies, and costs represent a 2030 development condition. The assumptions, sources of information, and description of the tool are discussed in the following sections.

19A.1.1 CWEST Development History

CWEST was developed in response to the requirements of the EIS quantitative analyses. CWEST provides a transparent, easy to use, and flexible tool that is applicable to many future studies. Table 19A.1 lists how CWEST fulfils the needs of the EIS quantitative analyses.

Table 19A.1 Comparison of CWEST to LCPSIM and OMWEM

Need for EIS	CWEST
Accurately represent each CVP and SWP M&I water user's individual behavior.	CWEST evaluates each CVP and SWP M&I water user separately.
Consistently evaluate across all CVP and SWP M&I water users.	All CVP and SWP M&I water users are in one spreadsheet. The same data structure and optimization routines apply to all.
Able to track and view model assumptions.	CWEST is an Excel tool designed to easily locate model assumptions.
Easily follow model logic and use of tool is simple.	CWEST optimization routine is traceable and the Excel tool is easy to use.
Need to estimate change in retail water sales revenues and groundwater pumping costs.	Includes water sales based on retail price and groundwater cost savings.

19A.1.1.1 Modeling Objectives

EIS modeling objectives accomplished with CWEST included the evaluation of the following potential impacts:

- Effects on CVP and SWP M&I water user costs and revenues
- Effects on end users from experiencing shortage costs
- Annual quantities of transferred water to CVP and SWP M&I water users

19A.1.2 CWEST Methodology

CWEST represents how CVP and SWP M&I water users will meet 2030 water demand levels at the lowest economic cost that are subject to constraints. The model assumes that each CVP and SWP M&I water user uses its contract delivery (modeled in CalSim II), local supplies, and imported water (if applicable) to meet annual demand. CWEST operates on an annual time step for the hydrologic period. The current application uses CVP and SWP delivery results modeled by CalSim II for the 1922 to 2003 period, but CWEST can easily be adapted to other input data and period of record. In years where available supplies are lower than demand, the CVP and SWP M&I water user will use local stored supplies, purchase or transfer water on a market, or short its customers—all of which results in an economic cost. If shortage and transfer costs occur frequently, the model could select to purchase additional fixed-yield supplies, such as additional desalination water treatment. Additional fixed-yield supplies will be purchased when the annual cost of the supply is less than the average annual costs of shortage. The model optimizes the additional supply decisions with perfect foresight to provide the lowest-cost water supply portfolio to meet 2030 demands throughout the 82-year hydrologic period.

CWEST uses water supply costs that represent the specific situation and supply conditions for each CVP and SWP M&I water user. Transfer and groundwater pumping costs vary by water-year type or by the region. All of these shortage costs are based on linear cost functions except for the end-user shortage costs. This cost function for retail water is non-linear; therefore, CWEST uses Excel Solver to find the optimal level of additional fixed-yield supply. CWEST uses the same cost function for each CVP and SWP M&I contractor and only has one function to represent all of their water users. At least one fixed-yield supply is included for every agency to choose when optimizing. Types of projects include stormwater, conservation, recycling, groundwater capacity, or desalination. The Metropolitan Water District of Southern California (MWDSC) can choose from five different fixed-yield project supply types, each with a unique increasing marginal cost function. The quantity of fixed-yield supply is a choice when optimizing and the cost for the new supply must be paid each year.

When annual supplies are in excess of demand, CWEST allows CVP and SWP M&I water users to reduce groundwater pumping, put water into local or regional storage (if applicable), or turn back the water. Each CVP and SWP M&I water user deals with excess water differently. Reduction in groundwater pumping results in a benefit based on the variable costs of groundwater pumping. Turning back water provides a cost savings based on the avoided conveyance charges. Fixed local supplies such as recycled water or desalination are not reduced in response to annual supply in excess of demand.

19A.1.3 CWEST Coverage

Individual CVP and SWP M&I water users are grouped into areas per the EIS. These regions correspond to the regions reported in Chapter 19, Socioeconomics. Table 19A.2 displays the CVP and SWP M&I water users included in each area.

Table 19A.2 CVP and SWP M&I Water Users Included in the EIS

Central Valley Region – Sacramento Valley	Centerville CSD, El Dorado Irrigation District, City of Folsom, Mountain Gate CSD, Napa County Flood Control and Water Conservation District, Placer County Water Agency, City of Redding, City of Roseville, Sacramento County Water Agency, San Juan Water District, Shasta CSD, Shasta County Water Agency, City of Shasta Lake, Solano County Water Agency, City of West Sacramento
Central Valley Region – San Joaquin Valley	Arvin-Edison Water Storage District, City of Avenal, City of Coalinga, Delano-Earlimart Irrigation District, City of Fresno, City of Huron, Kern County Water Agency, City of Lindsay, Lindsay-Strathmore Irrigation District, City of Orange Cove, Stockton-East Water District, City of Tracy
San Francisco Bay Area Region	Alameda County Water District, Contra Costa Water District, San Benito County Water District, Zone 6, Santa Clara Valley Water District, Zone 7 Water Agency
Central Coast Region	San Luis Obispo County Flood Control and Water Conservation District, Santa Barbara County Flood Control and Water Conservation District
Southern California Region	Antelope Valley-East Kern Water Agency, Castaic Lake Water Agency, Coachella Valley Water District, Crestline-Lake Arrowhead Water Agency, Desert Water Agency, Metropolitan Water District of Southern California, Mojave Water Agency, Palmdale Water District and Littlerock Creek Irrigation District, San Bernardino Valley Municipal Water District, San Gorgonio Pass Water Agency

Note:
CSD = Community Service District

Table 19A.3 displays why certain CVP and SWP M&I water users are not included in the EIS. Placeholders for San Gabriel Valley Municipal Water District, East Bay Municipal Utilities District, and Ventura County Watershed Protection District are included in CWEST, but are not modeled for the EIS.

Table 19A.3 CVP and SWP M&I Water Users excluded from EIS Analysis

CVP and SWP Water User	Reason
Bella Vista Water District	No discernible differences in deliveries in CalSim II model output.
Clear Creek CSD	No discernible differences in deliveries in CalSim II model output.
East Bay Municipal Utilities District	There is a lack of public information on major water supplies (Mokelumne Aqueduct).
El Dorado County Water Agency	Water user does not have conveyance.
Sacramento, City of	No discernible differences in deliveries in CalSim II model output.
San Gabriel Valley Municipal Water District	SWP water is solely for regional groundwater recharge.
Ventura County Watershed Protection District	No discernible differences in deliveries in CalSim II model output.

19A.2 CWEST Assumptions

This section describes the assumptions for the EIS Evaluation of Alternatives in Chapter 19, Socioeconomics, for the No Action Alternative, Second Basis of Comparison, and other alternatives.

The following CalSim II model simulations were performed as the basis of evaluating the impacts of the other alternatives:

- No Action Alternative
- Second Basis of Comparison

The following model simulations of other alternatives were performed:

- Alternative 1 – for simulation purposes, considered the same as Second Basis of Comparison
- Alternative 2 – for simulation purposes, considered the same as No Action Alternative
- Alternative 3
- Alternative 4 – for simulation purposes, considered the same as Second Basis of Comparison
- Alternative 5

Assumptions for each of these alternatives were developed with the surface water modeling tools described in Appendix 5A, CalSim II and DSM2 Modeling.

Because Alternative 1 modeling assumptions are the same as the Second Basis of Comparison and Alternative 2 modeling assumptions are the same as the No Action Alternative, the assumptions for those alternatives are not discussed separately in this document.

Each of the EIS alternatives were evaluated under the same set of local supply, demand, and cost assumptions for 2030 conditions. The only model input that varied across alternatives is the CalSim II CVP and SWP M&I water user delivery data.

19A.2.1 CVP and SWP M&I Water User Demand and Supply

19A.2.1.1 2030 CVP and SWP M&I Water User Demand

CVP and SWP M&I water user demands developed for CWEST are sourced from publicly available data. The majority of 2030 demands are reported in each CVP and SWP M&I water user's 2010 UWMP, with exceptions for those that did not create one (see Appendix 5D, CVP and SWP M&I Water User Supplies, for more information on 2030 demand levels and UWMP sources). The 2030 demand levels for CVP and SWP M&I water users without published UMWPs are provided by the CVP M&I Water Shortage Policy (WSP) Draft Environmental Impact Statement (Reclamation 2014). The UWMP demands presented for 2030 are assumed to be compliant with the "20% by 2020" legislation. In some cases, additional conservation is presented as part of 2030 supply in the UWMP. If so, this is counted as a demand reduction, not as a new supply in CWEST. Table 19A.4 displays the 2030 contract quantities and demand levels included in the model.

Table 19A.4 CWEST Modeled Demands in 2030

CVP and SWP M&I Water User	2030 CVP and SWP Contract Quantities (acre-feet)	2030 Demands from UWMP (acre-feet)
Alameda County Water District	42,000	71,800
Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District	2,926	6,000
Antelope Valley-East Kern Water Agency	141,400	96,558
Avenal, City of	3,500	3,500
Castaic Lake Water Agency	95,200	105,313
Coachella Valley Water District	133,100	212,000
Coalinga, City of	10,000	10,000
Contra Costa Water District	195,000	215,471
Crestline-Lake Arrowhead Water Agency	5,800	2,250
Desert Water Agency	54,000	69,400
El Dorado Irrigation District	7,550	57,039

CVP and SWP M&I Water User	2030 CVP and SWP Contract Quantities (acre-feet)	2030 Demands from UWMP (acre-feet)
Folsom, City of	34,000	36,259
Fresno, City of	60,000	201,100
Huron, City of	3,000	3,000
Kern County Water Agency	134,600	51,750
Lindsay, City of	2,500	2,689
MWDSC	2,185,600	4,455,000
Mojave Water Agency	75,800	192,969
Napa County Flood Control and Water Conservation District	29,025	21,572
Orange Cove, City of	1,400	2,790
Palmdale Water District and Littlerock Creek Irrigation District	21,300	45,700
Placer County Water Agency	100,000	156,333
Redding, City of	27,140	27,852
Roseville, City of	62,000	49,334
Sacramento County Water Agency	81,438	77,535
San Benito County Water District, Zone 6	8,250	11,583
San Bernardino Valley Municipal Water District	102,600	305,447
San Gorgonio Pass Water Agency	17,300	66,420
San Juan Water District	82,200	57,265
San Luis Obispo County Flood Control and Water Conservation District	8,447	8,150
Santa Barbara County Flood Control and Water Conservation District	62,039	75,935
Santa Clara Valley Water District	219,400	409,370
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD	10,672	10,942
Solano County Water Agency	47,756	82,250
Stockton-East Water District	75,000	64,960
Tracy, City of	20,000	31,000
West Sacramento, City of	23,600	19,273
Yuba City, City of	9,600	29,041
Zone 7 Water Agency	80,619	75,500

19A.2.1.2 Development of 2030 CVP and SWP M&I Water User Water Supplies

CWEST used the UWMP to report local supplies expected to be available in 2030. In some cases, UWMP supplies were adjusted for projects that may not be implemented by 2030. CWEST uses the 2030 UWMP "normal" year supplies to represent 2030 supplies in wet, above normal, and below normal years, and "multiple-year drought" supplies are used to represent 2030 supplies in dry and critical years. The Sacramento index is used for CVP and SWP M&I water users in the Sacramento Valley and the San Francisco Bay Area Region. The San Joaquin index is used for CVP and SWP M&I water users in the San Joaquin Valley, the Central Coast Region, and the Southern California Region.

Local, non-project supply amounts are as summarized in Table 19A.5. More information on normal year 2030 supply is described in Appendix 5D, CVP and SWP M&I Water User Supplies.

Table 19A.5 CWEST Assumed 2030 Non-Project Supplies

CVP and SWP M&I Water User	Non-Project Supplies in Below Normal or Better Water Year Type (acre-feet)	Non-Project Supplies in Dry or Critical Water Year Type (acre-feet)
Alameda County Water District	50,800	35,600
Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District*	3,000	0
Antelope Valley-East Kern Water Agency	40,000	20,000
Avenal, City of*	0	0
Castaic Lake Water Agency	77,787	77,787
Coachella Valley Water District	238,840	238,850
Coalinga, City of*	0	0
Contra Costa Water District	64,000	51,600
Crestline-Lake Arrowhead Water Agency	481	481
Desert Water Agency	69,900	89,000
El Dorado Irrigation District	54,789	54,789
Folsom, City of	3,250	11,250
Fresno, City of	228,800	232,400
Huron, City of*	0	0
Kern County Water Agency	68,126	40,130
Lindsay, City of*	1,210	1,210
MWDSC	3,040,100	3,142,300
Mojave Water Agency	152,921	176,785

CVP and SWP M&I Water User	Non-Project Supplies in Below Normal or Better Water Year Type (acre-feet)	Non-Project Supplies in Dry or Critical Water Year Type (acre-feet)
Napa County Flood Control and Water Conservation District	19,082	21,565
Orange Cove, City of*	0	0
Palmdale Water District and Littlerock Creek Irrigation District	39,600	42,059
Placer County Water Agency	68,119	103,119
Redding, City of	13,424	13,424
Roseville, City of	3,397	3,397
Sacramento County Water Agency	74,898	74,898
San Benito County Water District, Zone 6	5,174	5,174
San Bernardino Valley Municipal Water District	314,225	314,225
San Gorgonio Pass Water Agency	43,952	43,952
San Juan Water District	0	0
San Luis Obispo County Flood Control and Water Conservation District	8,288	8,288
Santa Barbara County Flood Control and Water Conservation District	79,490	79,490
Santa Clara Valley Water District	246,830	179,980
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD*	1,064	1,064
Solano County Water Agency	75,276	75,276
Stockton-East Water District	28,000	50,000
Tracy, City of	15,250	16,050
West Sacramento, City of	5,000	5,000
Yuba City, City of	22,748	22,748
Zone 7 Water Agency	11,600	2,620

Note:
*CVP and SWP M&I Water User without 2010 UWMP and supply and 2030 supply conditions are from CVP M&I WSP (Reclamation 2014)

19A.2.1.3 CalSim II Linkage Information

CalSim II node identification for each CVP and SWP M&I water user in the EIS analysis is displayed in Table 19A.6.

Table 19A.6 CWEST and CalSim II Linkage

CVP and SWP M&I Water User	CalSim II Equivalent Nodes
Alameda County Water District	D814_PCO + D814_PMI + D814_PIN
All other Friant-Kern M&I water users (Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District)	2.926*(D910_C1/60)
Antelope Valley-East Kern Water Agency	D877_PMI + D877_PCO + D877_PIN
Avenal, City of	D844_PMI*0.35
Castaic Lake Water Agency	D896_PMI + D896_PCO
Coachella Valley Water District	D883_PMI + D883_PCO + D883_PIN
Coalinga, City of	D844_PMI*0.5
Contra Costa Water District	D420
Crestline-Lake Arrowhead Water Agency	D25_PMI + D25_PCO
Desert Water Agency	D884_PMI + D884_PCO + D884_PIN
El Dorado Irrigation District	D8F_NP + D8F_PMI
Folsom, City of	D8B_NP + D8B_PMI
Fresno, City of	MAX(0.25*60, D910_C1*(60/64.802))
Huron, City of	D844_PMI*0.15
Kern County Water Agency	D851A_PMI
Lindsay, City of	2.5*(D910_C1/60)
MWDSC	D895_PMI + D895_PMI+ D895_PIN+ D899_PCO + D899_PCO + D899_PIN + D27_PMI +D27_PIN + D27_PCO +D885_PMI + D885_PCO + D885_PIN
Mojave Water Agency	D881_PMI + D881_PCO
Napa County Flood Control and Water Conservation District	D403B_PMI + D403B_PCO + D403B_PIN
Orange Cove, City of	1.4*(D910_C1/60)
Palmdale Water District and Littlerock Creek Irrigation District	D878_PMI + D878_PCO
Placer County Water Agency	D8H_PMI+D300_NP
Redding, City of	D104_PSC*0.13779 + D104_PMI*0.5
Roseville, City of	D8G_NP + D8G_PMI
Sacramento County Water Agency	D168C+D167B
San Benito County Water District, Zone 6	0.065*D711_PMI+0.518*D710_PAG
San Bernardino Valley Municipal Water District	D886_PMI + D886_PCO
San Gorgonio Pass Water Agency	D888_PMI + D888_PCO

CVP and SWP M&I Water User	CalSim II Equivalent Nodes
San Juan Water Agency	D8D_NP + D8E_NP + D8E_PMI
San Luis Obispo County Flood Control and Water Conservation District	[MIN(D869_PMI + D869_PCO,8.447)]
Santa Barbara County Flood Control and Water Conservation District	[((D870_PMI + D870_PCO) + ((D870_PMI + D870_PCO)—8.4)) * (0.852 if WY is W,AN,BN, 0.522 if WY is D,C)]
Santa Clara Valley Water District	D710_PAG * 0.442 + D711_PMI * 0.935 + D815_PCO + D815_PMI +D815_PIN
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD	D104_PMI*0.5 + D104_PMI*0.35
Solano County Water Agency	D403C_PMI + D403C_PCO
Stockton-East Water District	D520_SEWD_PMI
Tracy, City of	0.2*[South of Delta % PMI Delivery]
West Sacramento, City of	D165_PSC
Yuba City, City of	D204_PMI
Zone 7 Water Agency	D810_PCO + D810_PMI + D813_PCO + D813_PMI + D810_PIN

19A.2.1.4 Development of Storage Operations

CWEST includes storage operations for the CVP and SWP M&I water users with published information on local storage operations, who participate in a regional groundwater bank, or who use significant local groundwater banking to store water. CVP and SWP M&I water users that participate in Semitropic Water Storage District's groundwater banking program have their capacity share included. Most of MWDSC's portfolio of local storage projects are modeled. Table 19A.7 presents the list of storage operations included in CWEST.

Table 19A.7 Storage Operations Assumptions

Water User with Storage	Modeled Storage Capacities
Alameda County Water District	150,000 acre-foot Semitropic Water Storage District Share[a]
MWDSC	1,600,000 acre-foot Regional Groundwater Banks[b] 980,000 acre-foot Local Surface Storage[c]
Santa Clara Valley Water District	350,000 acre-foot Semitropic Water Storage District Share[a] 530,000 acre-foot Local Groundwater[d]
Stockton-East Water District	100,000 acre-foot Local Groundwater[e]
Zone 7 Water Agency	78,000 acre-foot Semitropic Water Storage District Share[a] 126,000 acre-foot Local Groundwater[f] 120,000 acre-foot Cawelo Water District[f]

Source:

a. SWSD 2015

b. Includes: Arvin Edison Water Storage District, Semitropic Water Storage District, Kern Delta Water District, Mojave Water Agency Storage Program, Conjunctive Use programs (MWDSC 2011)

c. Includes: Castaic Lake, Diamond Valley, Lake Mathews, Lake Skinner, and Cyclic Storage (MWDSC 2011)

d. SCVWD 2011

e. Stockton-East UWMP (SEWD 2011)

f. ACWD 2011

19A.2.2 Water Costs

Water costs include delivery, groundwater pumping, additional fixed-yield supply, storage operations, and shortage costs. Shortage costs include retail revenue losses, transfer and annual option, and end-user shortage costs. Increases in M&I deliveries raise total delivery costs, but may decrease shortage costs. Real increases in water and energy costs are used to escalate costs to the 2030 levels needed for the EIS analysis.

19A.2.2.1 Delivery Costs and Water Prices

CVP and SWP M&I deliveries are assigned a delivery cost based on Reclamation CVP M&I (Reclamation 2009) rates and Bulletin 132-10 (DWR 2013), respectively. In years when supply is in excess of demand, even after reductions in groundwater pumping are placed into storage, the quantity of excess water is credited the delivery costs. This represents a CVP and SWP M&I water user "turning back" water.

The delivery cost for SWP M&I water users is the variable OMP&R component plus the Off-Aqueduct charge, which is also charged based on the amount of deliveries (CCWA 2007). As an example, DWR calculates the Off-Aqueduct charges based on the requested deliveries submitted by the Central Coast Water

Authority on a calendar-year basis. The resulting total is paid by the Authority in 12 equal payments throughout the calendar year. Additionally, in May of each year, DWR provides an amended Off-Aqueduct bill based on the actual water deliveries and power costs for the first six months of the year. The delivery cost of CVP water is the "O&M rate" (Reclamation 2009).

Real energy costs are expected to increase in real terms leading up to 2030. The California Energy Commission (CEC) mid-demand scenario predicts that real electricity rates will increase 1.7 percent annually, over the 2014 to 2024 period (CEC 2013). This rate of increase is applied to water delivery costs up to 2030. Table 19A.8 provides the 2030 delivery costs for CVP and SWP M&I water users.

Table 19A.8 also shows representative retail water prices for each CVP and SWP M&I water user. MWDSC projects their water rates will have a 1.364 percent real rate of increase annually between 2014 and 2024. Other CVP and SWP M&I water users have not made long-range projections of real retail prices, so CWEST applies MWDSC's real rate of increase to all CVP and SWP M&I water user retail water prices to estimate 2030 levels. Retail water prices are used to estimate revenue losses to CVP and SWP M&I water users from a shortage.

Table 19A.8 Conveyance and Retail Water Price Assumptions

CVP and SWP M&I Water User	CVP and SWP Delivery Costs in 2030 ($/acre-foot)[a]	Retail Water Price in 2030 ($/acre-foot)[b]
Alameda County Water District	$30	$1,528
Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District	$16	$228
Antelope Valley-East Kern Water Agency	$145	$580
Avenal, City of	$16	$1,130
Castaic Lake Water Agency	$99	$1,462
Coachella Valley Water District	$162	$472
Coalinga, City of	$24	$228
Contra Costa Water District	$26	$1,577
Crestline-Lake Arrowhead Water Agency	$173	$402
Desert Water Agency	$139	$527
El Dorado Irrigation District	$16	$475
Folsom, City of	$16	$235
Fresno, City of	$16	$228
Huron, City of	$16	$228
Kern County Water Agency	$18	$290
Lindsay, City of	$16	$228

CVP and SWP M&I Water User	CVP and SWP Delivery Costs in 2030 ($/acre-foot)[a]	Retail Water Price in 2030 ($/acre-foot)[b]
MWDSC	$122	$1,374
Mojave Water Agency	$232	$1,175
Napa County Flood Control and Water Conservation District	$33	$1,921
Orange Cove, City of	$16	$228
Palmdale Water District and Littlerock Creek Irrigation District	$192	$580
Placer County Water Agency	$16	$594
Redding, City of	$16	$514
Roseville, City of	$16	$197
Sacramento County Water Agency	$25	$454
San Benito County Water District, Zone 6	$32	$890
San Bernardino Valley Municipal Water District	$154	$402
San Gorgonio Pass Water Agency	$323	$624
San Juan Water Agency	$16	$235
San Luis Obispo County Flood Control and Water Conservation District	$156	$2,429
Santa Barbara County Flood Control and Water Conservation District	$157	$1,719
Santa Clara Valley Water District	$27	$1,204
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD	$16	$596
Solano County Water Agency	$21	$1,198
Stockton-East Water District	$15	$507
Tracy, City of	$16	$582
West Sacramento, City of	$16	$454
Yuba City, City of	$0	$681
Zone 7 Water Agency	$42	$1,162

Source:

a. (Reclamation 2009) and (DWR 2013) escalated from 2010 to 2030 in proportion to the change in real energy prices (CEC 2013)

b. Published retail prices were chosen from representative locations (Black and Veatch 2006) and updated using MWDSC

19A.2.2.2 Additional Fixed-Yield Supply Costs

For each CVP and SWP M&I water user, at least one fixed-yield supply is available to choose in optimization. Examples include reclamation water projects, desalination, new groundwater development, and some types of conservation. Every year fixed-yield supplies provide the same amount of water and the annualized cost for operations and capital is paid. The model selects a level of fixed-yield supply that minimizes total cost over the hydrologic period. Table 19A.9 shows the fixed-yield supply included for each CVP and SWP M&I water user and its annualized cost except for those with multiple fixed-yield supplies to choose from.

A variety of data sources were used to obtain capital costs of representative projects including the UWMPs, integrated resource water management (IRWM) grant applications, water master plans, and other public information, as summarized in Appendix 5B, Municipal and Industrial Water Demands and Supplies.

For some CVP and SWP M&I water users in the Sacramento Valley, the model chooses an optimal increase in total groundwater pumping capacity when that is the additional fixed-yield supply to choose from. The model currently uses information from four representative urban well developments in Sonoma County (SCWA 2010). The annualized cost of well development for four wells was $358 per acre-foot. When a CVP and SWP M&I water user chooses to increase their groundwater pumping capacity, the annual pumping cost is added to obtain a total cost per acre-foot per year.

Table 19A.9 Information on Additional Fixed-Yield Supplies

CVP and SWP M&I Water User	Additional Fixed-Yield Supply Costs ($/acre-foot)[1]	Type or Name of Additional Fixed-Yield Supply
Alameda County Water District	Variable—See Table 19A.10	Variable—See Table 19A.10
Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District	$449	Develop groundwater[a]
Antelope Valley-East Kern Water Agency	$568	Regional aquifer project[b]
Avenal, City of	$266	Transfer/exchange[c]
Castaic Lake Water Agency	$400	None—assumed $400
Coachella Valley Water District	$258	Recycle golf course water[d]
Coalinga, City of	$274	Transfer/exchange[c]
Contra Costa Water District	$1,070	Bay Area Regional Desalination[e]
Crestline-Lake Arrowhead Water Agency	$423	Transfer/exchange[c]

CVP and SWP M&I Water User	Additional Fixed-Yield Supply Costs ($/acre-foot)[1]	Type or Name of Additional Fixed-Yield Supply
Desert Water Agency	$416	Additional Colorado River Aqueduct water[c]
El Dorado Irrigation District	$410	Develop groundwater[a]
Folsom, City of	$365	Willow Hill Pipeline Rehabilitation Project[f]
Fresno, City of	$449	Develop groundwater[a]
Huron, City of	$266	Transfer exchange[c]
Kern County Water Agency	$314	None—assumed $314
Lindsay, City of	$449	Develop groundwater[a]
MWDSC	Variable—See Table 19A.10	Variable—See Table 19A.10
Mojave Water Agency	$482	Transfer/exchange[c]
Napa County Flood Control and Water Conservation District	$233	Transfer/exchange[c]
Orange Cove, City of	$449	Develop groundwater[a]
Palmdale Water District and Littlerock Creek Irrigation District	$615	Regional Aquifer Project[g]
Placer County Water Agency	$410	Develop groundwater[a]
Redding, City of	$432	Develop groundwater[a]
Roseville, City of	$502	Develop groundwater[a]
Sacramento County Water Agency	$410	Develop groundwater[a]
San Benito County Water District, Zone 6	$384	Transfer/exchange[c]
San Bernardino Valley Municipal Water District	$366	Beaumont Avenue Recharge Facility[h]
San Gorgonio Pass Water Agency	$366	Beaumont Avenue Recharge Facility[h]
San Juan Water Agency	$138	Regional Indoor and Outdoor Efficiency[f]
San Luis Obispo County Flood Control and Water Conservation District	$475	Raise Lopez Dam 3-5 feet[i]
Santa Barbara County Flood Control and Water Conservation District	$804	Expand conjunctive use and groundwater[a]
Santa Clara Valley Water District	$1,795	Bay Area Regional Desalination[e]

CVP and SWP M&I Water User	Additional Fixed-Yield Supply Costs ($/acre-foot)[1]	Type or Name of Additional Fixed-Yield Supply
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD	$216	Transfer/exchange[c]
Solano County Water Agency	$221	Expand exchange with Mojave Water Agency[c]
Stockton-East Water District	$338	Delta Water Supply Project[j]
Tracy, City of	$266	Transfer/exchange[c]
West Sacramento, City of	$410	Develop groundwater[a]
Yuba City, City of	$432	Develop groundwater[a]
Zone 7 Water Agency	Variable—See Table 19A.10	Variable—See Table 19A.10

Source:
a. SCWA 2010 for cost of well development plus pumping cost from Table 19A.13
b. AVEK 2011
c. Transfer cost from Table 19A.11 plus delivery cost from Table 19A.8
d. CVWD 2013
e. BARDP 2011
f. RWA 2011
g. PRWA 2014
h. SGPWA 2013
i. Zone 3 2015
j. ESJGB 2014

Zone 7 Water Agency, Alameda County Water District, and MWDSC have multiple additional fixed-yield supplies modeled in CWEST. For MWDSC, five fixed yield options are provided: reclamation, desalination, groundwater recovery, conservation, and stormwater. Cost functions are included that express the average cost of supply as an increasing function of the amount used. Table 19A.10 displays the range of average cost for each supply type.

Table 19A.10 CVP and SWP M&I Water Users with Multiple Additional Fixed-Yield Supply Options

CVP and SWP M&I Water User	Additional Fixed-Yield Supply Costs ($/acre-foot)	Type or Name of Additional Fixed-Yield Supply	Maximum Quantity Available (acre-foot)
Alameda County Water District	$410	Conservation	3,600[a]
	$500	Expansion of Newark Facility	5,100[a]
MWDSC	$500 to $1,500[b]	Groundwater Recovery	92,000[c]
	$600 to $1,500[b]	Recycling	360,000[c]
	$192 to $1,300[d]	Conservation	346,000[c]
	$300 to $1,500[e]	Stormwater Capture	75,000[c]
	$1,300 to $2,000[b]	Desalination	84,000[c]
Zone 7 Water Agency	$20	Arroyo Valle—Perfection of Existing Permit	3,800[f]
	$30	Reduction of Demineralization Losses	260[f]
	$100	Reduction of Unaccounted-for-Water	1,300[f]
	$110	Enhance Existing In-lieu Recharge	500 – 830[f]
	$200	Arroyo Las Positas Water Rights	750[f]
	$285	Confirm Byron-Bethany Irrigation District Yield	3,000[f]
	$1,400	Intertie Supply: Long-term Lease	10,900[f]
	$1,500	Recycled Water—Direct	3,700[f]
	$1,600	Groundwater Injection: Recycled Water	2,800[f]
	$2,000	Intertie Supply: Regional Desalination	9,300[f]
	$2,400	Recycled Water—Storage	17,300[f]

Source:
a. ACWD 2014
b. MWDSC 2010
c. LADWP 2011
d. Mitchell 2005
e. LADWP 2014
f. Zone 7 WA 2011

19A.2.2.3 Transfer Costs and Annual Options

Annual options are supplies that can be made available to meet demands annually. The model allows for separate costs of these supplies in dry and critical years, and a separate cost in below normal or wetter years. In below normal or wetter years, these supplies are generally transfers or groundwater. In dry or critical years, these supplies are generally transfers; providers are not allowed to pump groundwater in excess of their UWMP levels.

Costs of water transfers are based on publications summarizing observed market prices. Water transfer prices in California ranged from $50 to $550 per acre-foot from 1992 to 2004 (Hanak and Stryjewski 2012). From 2008 to 2012, transfers originating from north of the Delta (NOD) cost $47 to $200 per acre-foot while transfers originating south of the Delta (SOD) cost $237 to $436 per acre-foot (Mann and Hatchett 2012). Drought conditions in 2013 led to an estimated increase of up to 40 percent from 2012 prices (WestWater Research 2013). Transfer prices were created for multiple regions, based on historical transfer prices detailed earlier, in the same area of origin. Colorado River transfer prices are included as a supply option for agencies receiving their SWP Table A water by exchange. Prices are based on planned prices for the water transfer between Imperial Irrigation District and San Diego County Water Authority. The dry/critical year price is calculated as the weighted average of historical dry and critical year prices, where the weights are the frequency of the two year types in the historical hydrology (18 dry years and 12 critical years). The Gross National Product Implicit Price Deflator was used to bring historical transfer prices to equivalent years.

These prices are intended to represent the analysis, and are not predictions. Also, prices provided in Table 19A.11 are at the source (location of purchase) and do not include delivery costs or losses. A conveyance loss of 18 percent is assumed for cross-Delta transfers. Water delivery costs presented in Table 19A.8 are included for all transfers.

Table 19A.11 Assumed Water Transfer Prices in CWEST, 2030 Conditions*

Condition	North of Delta Origin	South of Delta Origin	North of Delta with Conveyance Loss	Colorado River Transfers
Below Normal or Wetter	$200	$250	$244	$416
Dry or Critical	$378	$480	$461	$416

Note:
* See 19A.2.2.3, Transfer Costs and Annual Options for source information

19A.2.2.4 Storage Operations and Groundwater Costs

19A.2.2.4.1 Storage Operations Costs

Storage operations are included for MWDSC, some CVP and SWP M&I water users in the San Francisco Bay Area Region, and Stockton-East Water District. The San Francisco Bay Area Region includes local groundwater storage and Semitropic Water Bank storage for Santa Clara Valley Water District, Zone 7 and Alameda County Water District. Storage operation costs for MWDSC are based on information provided in its Water Surplus and Demand Management Plan (MWDSC, 2011). Semitropic Water Storage District's published put and take costs for banking operations are used in CWEST in addition to the delivery cost to each banking partner (SWSD 2014). Local groundwater storage operation costs used by San Francisco Bay Area Region CVP and SWP M&I contractors and Stockton-East Water District are based on the groundwater costs detailed in Table 19A.12.

19A.2.2.4.2 Groundwater Costs

CWEST includes an estimate of cost savings for groundwater not pumped when excess CVP and SWP water is available. Data on groundwater costs are from CVP and SWP M&I water user UWMPs, where possible. When this information is not available in UWMPs, groundwater pumping costs are based on estimates of regional depth to groundwater and electricity price. Depths to groundwater are from DWR's Bulletin 118—Groundwater Basin Maps and Descriptions (DWR, 2004). The amount of groundwater available in below normal or wetter, and dry or critical conditions is based on individual CVP and SWP M&I water user UWMPs.

Groundwater pumping costs were estimated for each EIS area based on a representative value from published information. CVP and SWP M&I water users in the Southern California Region have a groundwater pumping cost based on an estimate published in a Groundwater Basin Assessment (MWDSC 2007). Representative groundwater pumping costs in the Central Coast Region are based on recent estimates from the City of Santa Barbara (City of Santa Barbara 2015). Groundwater pumping costs in the San Francisco Bay Area Region are based on published estimates from San Benito County (SBCWD 2014). San Joaquin Valley groundwater pumping costs are based on published estimates from James Irrigation District and Fresno Irrigation District (KBWA 2013). Sacramento Valley had no readily available information on groundwater pumping estimates. Groundwater depth estimates and published estimates of groundwater pumping from the previous sources were used to interpolate groundwater pumping costs in the Sacramento Valley. This method was used to adjust groundwater pumping prices in other regions.

Additional costs associated with groundwater use include lower groundwater tables, subsidence, streamflow depletion, depreciation, and well replacement that should be included. In some locations, groundwater must be treated for water quality, which adds additional cost. No consistent source of information is available to assess these other costs, so cost per acre-foot is conservatively

increased by 10 percent to account for some of these costs. Real increases in energy costs were applied to groundwater pumping costs (CEC 2013). Table 9A.12 displays groundwater variable costs used in the model.

Table 19A.12 Groundwater Variable Pumping Costs

CVP and SWP M&I Water User	Estimated Groundwater Pumping Cost in 2030 ($/acre-foot)*
Alameda County Water District	$52
Arvin-Edison Water Storage District, Delano-Earlimart Irrigation District, Lindsay-Strathmore Irrigation District	$91
Antelope Valley-East Kern Water Agency	$171
Avenal, City of	$91
Castaic Lake Water Agency	$94
Coachella Valley Water District	$171
Coalinga, City of	$91
Contra Costa Water District	$52
Crestline-Lake Arrowhead Water Agency	$171
Desert Water Agency	$171
El Dorado Irrigation District	$52
Folsom, City of	$52
Fresno, City of	$91
Huron, City of	$91
Kern County Water Agency	$168
Lindsay, City of	$91
MWDSC	$94
Mojave Water Agency	$171
Napa County Flood Control and Water Conservation District	$108
Orange Cove, City of	$91
Palmdale Water District and Littlerock Creek Irrigation District	$171
Placer County Water Agency	$52
Redding, City of	$74
Roseville, City of	$52
Sacramento County Water Agency	$52
San Benito County Water District, Zone 6	$52
San Bernardino Valley Municipal Water District	$171
San Gorgonio Pass Water Agency	$171
San Juan Water Agency	$52
San Luis Obispo County Flood Control and Water Conservation District	$298

CVP and SWP M&I Water User	Estimated Groundwater Pumping Cost in 2030 ($/acre-foot)*
Santa Barbara County Flood Control and Water Conservation District	$298
Santa Clara Valley Water District	$52
Shasta Lake, City of, Shasta County Water Agency, Centerville CSD, Mountain Gate CSD, and Shasta CSD	$74
Solano County Water Agency	$108
Stockton-East Water District	$91
Tracy, City of	$91
West Sacramento, City of	$52
Yuba City, City of	$74
Zone 7 Water Agency	$52

Note:

* See 19A.2.2.4 Storage Operations and Groundwater Costs – *Groundwater Costs* for source information

19A.2.2.5 Shortage Costs

Shortages in critical years are represented in the common behavior of CVP and SWP M&I water users. CWEST requires that a 5 percent end-use drought conservation shortage is implemented before any annual supply is purchased in a critical year. A provider can then eliminate a shortfall using an annual option supply such as a transfer. There is no limit currently programmed in CWEST to limit annual option supplies; therefore, end-user shortages only occur during critical years.

Shortage costs are lost retail water revenue plus end-user shortage costs. Revenue losses are based on the water prices presented in Table 19A.8. The model calculates shortage costs based on a constant elasticity of demand function. This form of shortage loss function is standard practice in California water economics studies and has been documented (M. Cubed 2007). The 2030 retail water price presented in Table 19A.8 defines one point on the demand function, and the slope is defined by the price elasticity.

The short-run demand price elasticity assumed for all providers is -0.1. This elasticity represents a demand elasticity appropriate for drought conditions. A variety of studies have found short-run price elasticities in the range of -0.1 to -0.3 (Thomas and Syme 1988; A&N Technical Services 1996). California urban price elasticity is believed to be even more inelastic because of demand hardening. This means people's actions to reduce water use in response to shortages will already have been implemented by 2030. To evaluate 2030 conditions, -0.1 is used because it is the more inelastic estimate reported in the published information.

19A.3 CWEST Results

CWEST generates results for each CVP and SWP M&I water user, which can be aggregated into regions or a statewide total. Descriptions and interpretations of results for each region and EIS alternative are provided in Chapter 19, Socioeconomics. Table 19A.1 defines the report results and Tables 19A.14 through 19A.45 present the results for the EIS alternatives. CWEST results presented in this appendix are in 2014 dollars. Results provided in Chapter 19 have been translated to 2012 dollars to allow for comparison with SWAP and IMPLAN results.

Table 19A.13 Interpretation of Reported Results

Reported Results	Interpretation
Average Annual CVP and SWP Deliveries (TAF)	Average Annual CVP and SWP delivery quantity for the reported alternative
Delivery Cost ($1,000)	Delivery cost to deliver SWP/ CVP water
New Supply (TAF)	Additional 2030 fixed-yield supply above stated 2030 supplies. This is the cost-minimizing decision variable in the model.
Annualized New Supply Costs ($1,000)	Cost of optimal quantity of additional 2030 fixed-yield supply. Varies across water users by type of new supply listed in their UWMPs as likely new supply (e.g., desalination, recycling, conservation)
Surface/GW Storage Costs ($1,000)	Cost of annual puts/takes into local surface storage, local groundwater storage, or regional groundwater banks (e.g., Semitropic Water Storage District)
Lost Water Sales Revenues ($1,000)	Loss of retail water sales revenue due to shortage
Transfer Costs ($1,000)	Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
Shortage Costs ($1,000)	Estimated consumer surplus loss to water shortages
GW pumping savings ($1,000)	Savings from resulting reduction in groundwater pumping relative to UWMP levels
Excess Water Savings ($1,000)	Cost savings from contract water not used to meet demand or reduce groundwater pumping
Average Annual Cost ($1,000)	Lost water sales revenue plus change in delivery, new supply, storage, transfers, options, and groundwater costs

Notes:
GW = groundwater
TAF = thousand acre-feet

Table 19A.14 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative and Alternative 2	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	447	463	-16
Delivery Cost ($1,000)	$8,271	$8,566	$295
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$219	$213	$6
Transfer Costs ($1,000)	$761	$532	$229
Shortage Costs ($1,000)	$71	$70	$1
Reduction in Groundwater Pumping Costs (-$1,000)	-$3,973	-$4,033	$60
Savings from Excess Water (-$1,000)	-$2,344	-$2,640	$296
Average Annual Cost ($1,000)	**$3,006**	**$2,709**	**$297**

Note: In 2014 dollars

Table 19A.15 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative and Alternative 2	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	214	237	-23
Delivery Cost ($1,000)	$3,563	$3,969	$-406
New Supply (TAF)	2	0	2
Annualized New Supply Costs ($1,000)	$442	$16	$426
Surface/GW Storage Costs ($1,000)	$970	$845	$125
Lost Water Sales Revenues ($1,000)	$372	$332	$40
Transfer Costs ($1,000)	$2,753	$2,701	$51
Shortage Costs ($1,000)	$119	$105	$13
Reduction in Groundwater Pumping Costs (-$1,000)	-$15,837	-$16,490	$653
Excess Water Savings ($1,000)	-$1,060	-$1,358	$298
Average Annual Cost ($1,000)	**-$8,679**	**-$9,880**	**$1,201**

Note: In 2014 dollars

Table 19A.16 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative and Alternative 2	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	396	445	-48
Delivery Cost ($1,000)	$11,374	$12,889	-$1,515
New Supply (TAF)	8	6	2
Annualized New Supply Costs ($1,000)	$617	$241	$376
Surface/GW Storage Costs ($1,000)	$1,624	$2,021	-$398
Lost Water Sales Revenues ($1,000)	$4,415	$1,643	$2,772
Transfer Costs ($1,000)	$5,893	$1,189	$4,704
Shortage Costs ($1,000)	$1,452	$538	$914
Reduction in Groundwater Pumping Costs (-$1,000)	-$508	-$815	$307
Excess Water Savings ($1,000)	-$232	-$565	$333
Average Annual Cost ($1,000)	**$24,635**	**$17,141**	**$7,494**

Note: In 2014 dollars

Table 19A.17 Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative and Alternative 2	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	44	54	-10
Delivery Cost ($1,000)	$6,863	8,418	-1,556
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,309	-$8,901	$593
Excess Water Savings ($1,000)	-$3,058	-$4,301	$1,242
Average Annual Cost ($1,000)	**-$4,505**	**-$4,784**	**$279**

Note: In 2014 dollars

Table 19A.18 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative and Alternative 2	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	1,932	2,394	-461
Delivery Cost ($1,000)	$246,862	$305,673	-$58,811
New Supply (TAF)	47	11	35
Annualized New Supply Costs ($1,000)	$13,067	$4,153	$8,915
Surface/GW Storage Costs ($1,000)	$7,825	$2,909	$4,916
Lost Water Sales Revenues ($1,000)	$15,051	$1,153	$13,899
Transfer Costs ($1,000)	$11,827	$3,816	$8,011
Shortage Costs ($1,000)	$17,837	$363	$17,474
Reduction in Groundwater Pumping Costs (-$1,000)	-$59,193	-$94,244	$35,051
Excess Water Savings ($1,000)	-$4,768	-$10,889	$6,121
Average Annual Cost ($1,000)	**$248,509**	**$212,933**	**$35,576**

Note: In 2014 dollars

Table 19A.19 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under Alternative 1 as Compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	463	447	16
Delivery Cost ($1,000)	$8,566	$8,271	$295
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$213	$219	-$6
Transfer Costs ($1,000)	$532	$761	-$229
Shortage Costs ($1,000)	$70	$71	-$1
Reduction in Groundwater Pumping Costs (-$1,000)	-$4,033	-$3,973	-$60
Excess Water Savings ($1,000)	-$2,640	-$2,344	-$296
Average Annual Cost ($1,000)	**$2,709**	**$3,006**	**-$297**

Note: In 2014 dollars

Table 19A.20 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under Alternative 1 as Compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	237	214	23
Delivery Cost ($1,000)	$3,969	$3,563	$406
New Supply (TAF)	0	2	-2
Annualized New Supply Costs ($1,000)	$16	$442	-$426
Surface/GW Storage Costs ($1,000)	$845	$970	-$125
Lost Water Sales Revenues ($1,000)	$332	$372	-$40
Transfer Costs ($1,000)	$2,701	$2,753	-$51
Shortage Costs ($1,000)	$105	$119	-$13
Reduction in Groundwater Pumping Costs (-$1,000)	-$16,490	-$15,837	-$653
Excess Water Savings ($1,000)	-$1,358	-$1,060	-$298
Average Annual Cost ($1,000)	**-$9,880**	**-$8,679**	**-$1,201**

Note: In 2014 dollars

Table 19A.21 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under Alternative 1 as Compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	445	396	48
Delivery Cost ($1,000)	$12,889	$11,374	$1,515
New Supply (TAF)	6	8	-2
Annualized New Supply Costs ($1,000)	$241	$617	-$376
Surface/GW Storage Costs ($1,000)	$2,021	$1,624	$398
Lost Water Sales Revenues ($1,000)	$1,643	$4,415	-$2,772
Transfer Costs ($1,000)	$1,189	$5,893	-$4,704
Shortage Costs ($1,000)	$538	$1,452	-$914
Reduction in Groundwater Pumping Costs (-$1,000)	-$815	-$508	-$307
Excess Water Savings ($1,000)	-$565	-$232	-$333
Average Annual Cost ($1,000)	**$17,141**	**$24,635**	**-$7,494**

Note: In 2014 dollars

Table 19A.22 Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under Alternative 1 as Compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	54	44	10
Delivery Cost ($1,000)	$8,418	$6,863	$1,556
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,901	-$8,309	-$593
Excess Water Savings ($1,000)	-$4,301	-$3,058	-$1,242
Average Annual Cost ($1,000)	**-$4,784**	**-$4,505**	**-$279**

Note: In 2014 dollars

Table 19A.23 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under Alternative 1 as Compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	2,394	1,932	461
Delivery Cost ($1,000)	$305,673	$246,862	$58,811
New Supply (TAF)	11	47	-35
Annualized New Supply Costs ($1,000)	$4,153	$13,067	-$8,915
Surface/GW Storage Costs ($1,000)	$2,909	$7,825	-$4,916
Lost Water Sales Revenues ($1,000)	$1,153	$15,051	-$13,899
Transfer Costs ($1,000)	$3,816	$11,827	-$8,011
Shortage Costs ($1,000)	$363	$17,837	-$17,474
Reduction in Groundwater Pumping Costs (-$1,000)	-$94,244	-$59,193	-$35,051
Excess Water Savings ($1,000)	-$10,889	-$4,768	-$6,121
Average Annual Cost ($1,000)	**$212,933**	**$248,509**	**-$35,576**

Note: In 2014 dollars

Table 19A.24 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	461	447	13
Delivery Cost ($1,000)	$8,533	$8,271	$262
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$250	$219	$31
Transfer Costs ($1,000)	$619	$761	-$143
Shortage Costs ($1,000)	$79	$71	$8
Reduction in Groundwater Pumping Costs (-$1,000)	-$4,056	-$3,973	-$83
Excess Water Savings ($1,000)	-$2,592	-$2,344	-$249
Average Annual Cost ($1,000)	**$2,832**	**$3,006**	**-$174**

Note: In 2014 dollars

Table 19A.25 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	241	214	27
Delivery Cost ($1,000)	$4,013	$3,563	$449
New Supply (TAF)	0	2	-2
Annualized New Supply Costs ($1,000)	$13	$442	-$429
Surface/GW Storage Costs ($1,000)	$478	$970	-$491
Lost Water Sales Revenues ($1,000)	$292	$372	-$80
Transfer Costs ($1,000)	$2,167	$2,753	-$585
Shortage Costs ($1,000)	$92	$119	-$27
Reduction in Groundwater Pumping Costs (-$1,000)	-$16,129	-$15,837	-$291
Excess Water Savings ($1,000)	-$1,419	-$1,060	-$359
Average Annual Cost ($1,000)	**-$10,492**	**-$8,679**	**-$1,813**

Note: In 2014 dollars

Table 19A.26 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	431	396	34
Delivery Cost ($1,000)	$12,458	$11,374	$1,083
New Supply (TAF)	$8	$8	$0
Annualized New Supply Costs ($1,000)	$593	$617	-$24
Surface/GW Storage Costs ($1,000)	$2,372	$1,624	$748
Lost Water Sales Revenues ($1,000)	$2,452	$4,415	-$1,962
Transfer Costs ($1,000)	$1,881	$5,893	-$4,012
Shortage Costs ($1,000)	$766	$1,452	-$687
Reduction in Groundwater Pumping Costs (-$1,000)	-$748	-$508	-$239
Excess Water Savings ($1,000)	-$404	-$232	-$172
Average Annual Cost ($1,000)	**$19,369**	**$24,635**	**-5,266**

Note: In 2014 dollars

Table 19A.27 Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	51	44	8
Delivery Cost ($1,000)	$8,048	$6,863	$1,185
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,582	-$8,309	-$273
Excess Water Savings ($1,000)	-$4,099	-$3,058	-$1,041
Average Annual Cost ($1,000)	**-$4,633**	**-$4,505**	**-$129**

Note: In 2014 dollars

Table 19A.28 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	2,241	1,932	308
Delivery Cost ($1,000)	$286,403	$246,862	$39,541
New Supply (TAF)	40	47	-7
Annualized New Supply Costs ($1,000)	$10,901	$13,067	-$2,167
Surface/GW Storage Costs ($1,000)	$8,398	$7,825	$573
Lost Water Sales Revenues ($1,000)	$11,750	$15,051	-$3,301
Transfer Costs ($1,000)	$6,366	$11,827	-$5,461
Shortage Costs ($1,000)	$13,010	$17,837	-$4,827
Reduction in Groundwater Pumping Costs (-$1,000)	-$84,136	-$59,193	-$24,943
Excess Water Savings ($1,000)	-$9,275	-$4,768	-$4,507
Average Annual Cost ($1,000)	**$243,416**	**$248,509**	**-$5,092**

Note: In 2014 dollars

Table 19A.29 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	461	463	-2
Delivery Cost ($1,000)	$8,533	$8,566	-$33
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$250	$213	$36
Transfer Costs ($1,000)	$619	$532	$86
Shortage Costs ($1,000)	$79	$70	$9
Reduction in Groundwater Pumping Costs (-$1,000)	-$4,056	-$4,033	-$23
Excess Water Savings ($1,000)	-$2,592	-$2,640	$48
Average Annual Cost ($1,000)	**$2,832**	**$2,709**	**$123**

Note: In 2014 dollars

Table 19A.30 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	241	237	4
Delivery Cost ($1,000)	$4,013	$3,969	$44
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$13	$16	-$3
Surface/GW Storage Costs ($1,000)	$478	$845	-$366
Lost Water Sales Revenues ($1,000)	$292	$332	-$40
Transfer Costs ($1,000)	$2,167	$2,701	-$534
Shortage Costs ($1,000)	$92	$105	-$13
Reduction in Groundwater Pumping Costs (-$1,000)	-$16,129	-$16,490	$361
Excess Water Savings ($1,000)	-$1,419	-$1,358	-$61
Average Annual Cost ($1,000)	**-$10,492**	**-$9,880**	**-$612**

Note: In 2014 dollars

Table 19A.31 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	431	445	-14
Delivery Cost ($1,000)	$12,458	$12,889	-$432
New Supply (TAF)	8	6	2
Annualized New Supply Costs ($1,000)	$593	$241	$352
Surface/GW Storage Costs ($1,000)	$2,372	$2,021	$350
Lost Water Sales Revenues ($1,000)	$2,452	$1,643	$810
Transfer Costs ($1,000)	$1,881	$1,189	$692
Shortage Costs ($1,000)	$766	$538	$227
Reduction in Groundwater Pumping Costs (-$1,000)	-$748	-$815	$68
Excess Water Savings ($1,000)	-$404	-$565	$161
Average Annual Cost ($1,000)	**$19,369**	**$17,141**	**$2,228**

Note: In 2014 dollars

Table 19A.32 Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	51	54	-2
Delivery Cost ($1,000)	$8,048	$8,418	-$371
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,582	-$8,901	$320
Excess Water Savings ($1,000)	-$4,099	-$4,301	$202
Average Annual Cost ($1,000)	**-$4,633**	**-$4,784**	**$151**

Note: In 2014 dollars

Table 19A.33 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	2,241	2,394	-153
Delivery Cost ($1,000)	$286,403	$305,673	-$19,270
New Supply (TAF)	40	11	28
Annualized New Supply Costs ($1,000)	$10,901	$4,153	$6,748
Surface/GW Storage Costs ($1,000)	$8,398	$2,909	$5,489
Lost Water Sales Revenues ($1,000)	$11,750	$1,153	$10,597
Transfer Costs ($1,000)	$6,366	$3,816	$2,550
Shortage Costs ($1,000)	$13,010	$363	$12,646
Reduction in Groundwater Pumping Costs (-$1,000)	-$84,136	-$94,244	$10,108
Excess Water Savings ($1,000)	-$9,275	-$10,889	$1,615
Average Annual Cost ($1,000)	**$254,212**	**$218,820**	**$35,392**

Note: In 2014 dollars

Table 19A.34 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	447	447	-1
Delivery Cost ($1,000)	$8,262	$8,271	-$8
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$210	$219	-$9
Transfer Costs ($1,000)	$774	$761	$13
Shortage Costs ($1,000)	$70	$71	-$2
Reduction in Groundwater Pumping Costs (-$1,000)	-$3,972	-$3,973	$1
Excess Water Savings ($1,000)	-$2,333	-$2,344	$10
Average Annual Cost ($1,000)	**$3,011**	**$3,006**	**$5**

Note: In 2014 dollars

Table 19A.35 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	211	214	-3
Delivery Cost ($1,000)	$3,513	$3,563	-$51
New Supply (TAF)	$2	$2	$1
Annualized New Supply Costs ($1,000)	$619	$442	$177
Surface/GW Storage Costs ($1,000)	$994	$970	$25
Lost Water Sales Revenues ($1,000)	$372	$372	$0
Transfer Costs ($1,000)	$2,740	$2,753	-$12
Shortage Costs ($1,000)	$119	$119	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$15,787	-$15,837	$50
Excess Water Savings ($1,000)	-$1,026	-$1,060	$34
Average Annual Cost ($1,000)	**-$8,457**	**-$8,679**	**$222**

Note: In 2014 dollars

Table 19A.36 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	394	396	-3
Delivery Cost ($1,000)	$11,290	$11,374	-$84
New Supply (TAF)	8	8	0
Annualized New Supply Costs ($1,000)	$617	$617	$0
Surface/GW Storage Costs ($1,000)	$1,540	$1,624	-$84
Lost Water Sales Revenues ($1,000)	$4,491	$4,415	$76
Transfer Costs ($1,000)	$6,340	$5,893	$447
Shortage Costs ($1,000)	$1,493	$1,452	$41
Reduction in Groundwater Pumping Costs (-$1,000)	-$484	-$508	$25
Excess Water Savings ($1,000)	-$232	-$232	$0
Average Annual Cost ($1,000)	**$25,056**	**$24,635**	**$421**

Note: In 2014 dollars

Table 19A.37 Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	43	44	-1
Delivery Cost ($1,000)	$6,763	$6,863	-$100
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,258	-$8,309	$51
Excess Water Savings ($1,000)	-$2,986	-$3,058	$73
Average Annual Cost ($1,000)	**-$4,481**	**-$4,505**	**$24**

Note: In 2014 dollars

Table 19A.38 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP and SWP Deliveries (TAF)	1,912	1,932	-20
Delivery Cost ($1,000)	$244,210	$246,862	-$2,652
New Supply (TAF)	81	47	34
Annualized New Supply Costs ($1,000)	$24,915	$13,067	$11,847
Surface/GW Storage Costs ($1,000)	$7,697	$7,825	-$128
Lost Water Sales Revenues ($1,000)	$14,631	$15,051	-$420
Transfer Costs ($1,000)	$10,820	$11,827	-$1,008
Shortage Costs ($1,000)	$17,160	$17,837	-$677
Reduction in Groundwater Pumping Costs (-$1,000)	-$60,068	-$59,193	-$875
Excess Water Savings ($1,000)	-$4,726	-$4,768	$42
Average Annual Cost ($1,000)	**$254,639**	**$248,509**	**$6,130**

Note: In 2014 dollars

Table 19A.39 Changes in Sacramento Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	447	463	-16
Delivery Cost ($1,000)	$8,262	$8,566	-$304
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$210	$213	-$3
Transfer Costs ($1,000)	$774	$532	$242
Shortage Costs ($1,000)	$70	$70	-$1
Reduction in Groundwater Pumping Costs (-$1,000)	-$3,972	-$4,033	$61
Excess Water Savings ($1,000)	-$2,333	-$2,640	$306
Average Annual Cost ($1,000)	**$3,011**	**$2,709**	**$302**

Note: In 2014 dollars

Table 19A.40 Changes in San Joaquin Valley CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	211	237	-26
Delivery Cost ($1,000)	$3,513	$3,969	-$457
New Supply (TAF)	2	0	2
Annualized New Supply Costs ($1,000)	$619	$16	$603
Surface/GW Storage Costs ($1,000)	$994	$845	$150
Lost Water Sales Revenues ($1,000)	$372	$332	$40
Transfer Costs ($1,000)	$2,740	$2,701	$39
Shortage Costs ($1,000)	$119	$105	$13
Reduction in Groundwater Pumping Costs (-$1,000)	-$15,787	-$16,490	$703
Excess Water Savings ($1,000)	-$1,026	-$1,358	$332
Average Annual Cost ($1,000)	**-$8,457**	**-$9,880**	**$1,423**

Note: In 2014 dollars

Table 19A.41 Changes in San Francisco Bay Area Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	394	445	-51
Delivery Cost ($1,000)	$11,290	$12,889	-$1,599
New Supply (TAF)	8	6	2
Annualized New Supply Costs ($1,000)	$617	$241	$376
Surface/GW Storage Costs ($1,000)	$1,540	$2,021	-$481
Lost Water Sales Revenues ($1,000)	$4,491	$1,643	$2,848
Transfer Costs ($1,000)	$6,340	$1,189	$5,152
Shortage Costs ($1,000)	$1,493	$538	$955
Reduction in Groundwater Pumping Costs (-$1,000)	-$484	-$815	$332
Excess Water Savings ($1,000)	-$232	-$565	$333
Average Annual Cost ($1,000)	**$25,056**	**$17,141**	**$7,915**

Note: In 2014 dollars

Table 19A.42: Changes in Central Coast Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	43	54	-11
Delivery Cost ($1,000)	$6,763	$8,418	-$1,655
New Supply (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Surface/GW Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Reduction in Groundwater Pumping Costs (-$1,000)	-$8,258	-$8,901	$644
Excess Water Savings ($1,000)	-$2,986	-$4,301	$1,315
Average Annual Cost ($1,000)	**-$4,481**	**-$4,784**	**$304**

Note: In 2014 dollars

Table 19A.43 Changes in Southern California Region CVP and SWP M&I Water User Costs over the Long-term Average Conditions under the Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP and SWP Deliveries (TAF)	1,912	2,394	-482
Delivery Cost ($1,000)	$244,210	$305,673	-$61,462
New Supply (TAF)	81	11	70
Annualized New Supply Costs ($1,000)	$24,915	$4,153	$20,762
Surface/GW Storage Costs ($1,000)	$7,697	$2,909	$4,788
Lost Water Sales Revenues ($1,000)	$14,631	$1,153	$13,478
Transfer Costs ($1,000)	$10,820	$3,816	$7,003
Shortage Costs ($1,000)	$17,160	$363	$16,797
Reduction in Groundwater Pumping Costs (-$1,000)	-$60,068	-$94,244	$34,176
Excess Water Savings ($1,000)	-$4,726	-$10,889	$6,164
Average Annual Cost ($1,000)	**$254,639**	**$212,933**	**$41,706**

Note: In 2014 dollars

The maximum single-year transfers are listed in Table 19A.44. An analysis on available capacity to complete these transfers concluded that transfer quantities in each alternative will not be limited by delta pumping capacity. Conservative estimates of the quantity of transfers going south of the Delta were used with published information (USFWS 2008) on transfer quantities that did not show any capacity limitations.

Table 19A.44 Annual Transfer Analysis

Maximum Single-Year Transfers by Region Across Alternatives				
Alternative	**NAA**	**SBC and Alt 1**	**Alt 3**	**Alt 5**
Central Valley Region— Sacramento Valley	18	15	16	17
Central Valley Region—San Joaquin Region	10	11	11	9
San Francisco Bay Area Region	209	110	143	209
Central Coast Region	0	0	0	0
Southern California Region	442	62	184	405
Statewide Total	679	197	354	641

Notes:
NAA – No Action Alternative
SBC – Second Basis of Comparison
Alt 1 – Alternative 1
Alt 3 – Alternative 3
Alt 5 – Alternative 5

Table 19A.45 Alternatives Difference in Annual Transfers

Maximum Single-Year Transfers by Alternatives Comparison			
Alternative	**Alt 1 vs NAA**	**Alt 3 vs NAA**	**Alt 5 vs NAA**
Central Valley Region— Sacramento Valley	-4	-2	-1
Central Valley Region—San Joaquin Region	1	1	-1
San Francisco Bay Area Region	-100	-66	0
Central Coast Region	0	0	0
Southern California Region	-380	-258	-36
Statewide Total	-482	-324	-38

Notes:
Alt 1 vs NAA – Alternative 1 compared to No Action Alternative
Alt 3 vs NAA – Alternative 3 compared to No Action Alternative
Alt 5 vs NAA – Alternative 5 compared to No Action Alternative
SOD transfer limits: 600 TAF Dry/Critical years, 360 TAF all other years (USFWS 2008)

19A.3.1 Result Data for Other Models

CWEST results are used by the IMPLAN model, as described in Chapter 19, Socioeconomics. Because of the cost recovery requirements of public utilities, changes to CVP and SWP M&I water user costs are passed directly to the utilities' customers, and therefore affect customers' income available to spend on other purchases. Changes in CVP and SWP M&I deliveries can also affect water sales. These two categories of changes, to water sales net revenue and to local utilities' spending on imported water supplies and other imports, are used to assess regional economic impacts.

19A.3.2 Model Limitations and Applicability

Although it is impossible to represent precisely and in detail the economic costs and tradeoffs faced by each CVP and SWP M&I water user, CWEST provides representative cost estimates across EIS alternatives. Economic models are inherently inexact because mathematical descriptions are used to simulate complex human and organizational decisions. However, CWEST can provide realistic and representative estimates of changes in economic costs for the EIS alternatives.

Other challenges in modeling reduce the accuracy of CWEST's estimates of the economic benefits of CVP and SWP M&I water user water supplies. Conducting the analysis at an annual time step does not allow for in-season water supply decisions. Decisions involving large capital investments are not always based entirely on economic criteria. CWEST does not model political concerns and constraints or other local preferences.

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Appendix 19B

IMPLAN Model Documentation

This appendix provides information about the analytical approach, assumptions, data sources and limitations of the IMpact Analysis for PLANning (IMPLAN) model used to evaluate the regional economic impacts under each of the Remand Environmental Impact Statement (EIS) alternatives. This appendix also provides specific assumptions used to link the results from the other economic models to the IMPLAN regional models.

This appendix is organized into three main sections:

- Section 19B.1: IMPLAN Model Analytical Approach
  - This section provides information about the overall analytical framework including the assumptions underlying the IMPLAN model, data sources and the limitations of the model.
- Section 19B.2: Regional Economic Modeling Assumptions
  - This section provides a brief description of the specific assumptions used to link output from the Statewide Agricultural Production (SWAP) model (see Appendix 12A) and California Water Economics Spreadsheet Tool (CWEST) model (see Appendix 19A) to specific IMPLAN regional models. These specific IMPLAN models are used to evaluate potential regional economic changes associated with alternatives with respect to both the No Action Alternative and the Second Basis of Comparison.
- Section 19B.3: IMPLAN Model Results
  - This section provides the results from the IMPLAN model runs.

19B.1 IMPLAN Model Analytical Approach

Regional economic impacts are concerned with the effects of changes in the economy of a region. The magnitudes of the economic impacts are determined by the interactions between linkages within the local/regional economy and the leakages from this economy to the larger economy. Economic linkages are the relationships between industries, businesses, factors of production (e.g., labor and capital) and government created by trade and other exchange, such as taxes, within and among regions. Economic linkages create multiplier effects in a regional economy as money is circulated by trade. The magnitudes of impacts resulting from economic linkages are limited by the amount of leakage that occurs within the region. Economic leakages are a measure of the income shares spent outside of the region. Thus, the more the economic leakage, the less the multiplier effect. Economic leakages are generally higher the smaller the regional economy. For example, the economic leakages for a county are larger than those for the state which are larger than those for the nation.

19B.1.1 Tools and Assumptions

A number of regional economic analysis modeling systems (consisting of data as well as analytical software) are available for use in regional economic analysis, such as Regional Economic Models Inc. (REMI), Regional Industrial Multiplier System II (RIMS II), and IMPLAN. IMPLAN is a computer database and modeling system used to create Input-Output (I-O) models for any combination of US. counties. IMPLAN was originally developed by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency and the U.S. Department of the Interior (DOI) Bureau of Land Management to assist in land and resource management planning. In 1984, the U.S. Forest Service partnered with the University of Minnesota to expand and update IMPLAN data products. The updated IMPLAN software remained with the U.S. Forest Service. Beginning in 1993 through 2013, development of the IMPLAN was under exclusive rights of the Minnesota Implan Group, Inc. (MIG, Inc.), located in Stillwater, Minnesota. MIG, Inc. licensed and distributed the software to users. In 2013 MIG Inc. was purchased by IMPLAN Group LLC, which relocated the offices to Huntersville, North Carolina.

The IMPLAN Model is the most widely used I-O impact model system in the United States. Much more than a set of multipliers, it provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region, or state, and used to assess the "ripple effects" or "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This is used primarily to assess the economic impacts of facilities or industries, or changes in their level of activity in a given area.

IMPLAN is a static model that estimates impacts for a snapshot in time when the impacts are expected to occur, based on the makeup of the economy at the time of the underlying IMPLAN data. IMPLAN measures the initial impact to the economy but does not consider long-term adjustments as labor and capital move into alternative uses. This approach is used to compare the alternatives. Realistically, the structure of the economy will adapt and change; therefore, the IMPLAN results can only be used to compare relative changes between alternatives and the No Action Alternative and Second Basis of Comparison and cannot be used to predict or forecast future employment, labor income, or output (sales).

Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the analysis area (imports and value added) stop the cycle. These indirect and induced effects (the effects of household spending) can be mathematically derived using a set of multipliers. The multipliers describe the change in output for each regional industry caused by a 1-dollar change in final demand. Figure 19B.1 illustrates the concept of I-O modeling.

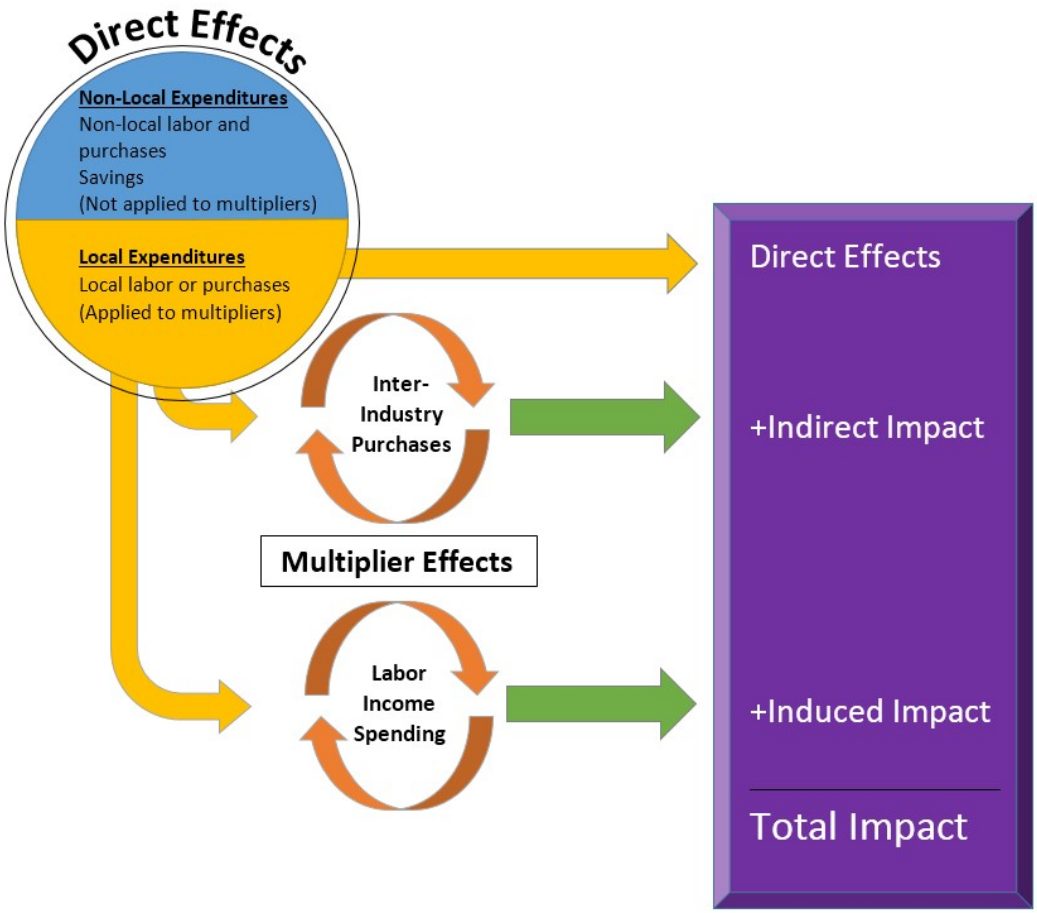

Figure 19B.1 Input-Output Modeling Concept

IMPLAN includes estimates of final demands and final payments for each county developed from government data, a national average matrix of technical coefficients, mathematical tools which help the user make the I-O model, and tools which allow the user to change data, conduct impact analysis, and generate reports.

19B.1.2 Limitations

One of the major limitations with the I-O methodology is the assumption of fixed proportions: for any good or service; all inputs are combined in fixed proportions that are invariant with the level of output. Hence, there is no substitution among production inputs and no economies of scale are possible. Additionally, each production function incorporates fixed, invariant technology.

I-O methodology does not model price effects that might be important to a region. The methodology also assumes that resources that become unemployed or employed due to a change in final demand have no alternative employment.

Finally, the IMPLAN database, even for a single county region, is very large, incorporating up to 440 sectors and more than 20 variables. It is constantly being updated as more data become available and it is virtually impossible to check

every number for accuracy. For multi-county regions, the problem is even greater, since validation should begin at the county rather than the regional level. This limitation has been addressed in part in this study by validating the key numbers and coefficients for the IMPLAN sectors of most interest for this EIS.

19B.1.3 Data Sources

The economic data for the IMPLAN model come from the system of national accounts for the United States based on data collected by the U.S. Department of Commerce's Bureau of Economic Analysis, the U.S. Department of Labor's Bureau of Labor Statistics, and other federal and state government agencies. Data are collected for 440 distinct producing industry sectors of the national economy corresponding to the North American Industry Classification System (NAICS). Industry sectors are classified on the basis of the primary commodity or service produced. Corresponding data sets are also produced for each county in the United States, allowing analyses at the county level and for geographic aggregations such as clusters of contiguous counties, individual states, or groups of states. Initially, MIG Inc., and now the IMPLAN Group LLC provide annual IMPLAN I-O datasets representing the state of the economy for any region. Since these data rely on the release of federal economic data, the release of the IMPLAN I-O dataset typically lags by a year or two. For this EIS, the 2012 IMPLAN I-O data were used since this was the most recent dataset available at the time when preparation of this EIS commenced.

Data provided for each industry sector include outputs and inputs from other sectors, value added, employment, wages and business taxes paid, imports and exports, final demand by households and government, capital investment, business inventories, marketing margins, and inflation factors (deflators). These data are provided both for the 440 producing sectors at the national level and for the corresponding sectors at the county level. Data on the technological mix of inputs and levels of transactions between producing sectors are taken from detailed input-output tables of the national economy. National and county level data are the basis for IMPLAN calculations of input-output tables and multipliers for local areas.

19B.2 Regional IMPLAN Model Assumptions

The regional economic analysis was conducted using results from the agricultural production and municipal and industrial (M&I) water use impact analyses. The incremental impact results, estimated by the SWAP and CWEST economic models, were input into the regional IMPLAN models as the direct change caused by each of alternative as compared to the No Action Alternative and the Second Basis of Comparison. The IMPLAN models were then used to estimate the secondary (indirect and induced) regional employment, income, and output.

19B.2.1 Modeling Objectives

The regional economic impacts identified in Chapter 12, Agricultural Resources, and Chapter 19, Socioeconomics, were evaluated for each alternative. Modeling objectives included the evaluation of the following potential impacts:

- Effects on regional employment
- Effects on regional labor income
- Effects on regional total economic output

19B.2.2 Study Areas

Models of the multi-county regions identified in the Affected Environment of Chapter 19, Socioeconomics, were used to measure impacts in terms of total changes in employment, income and economic output in these regions. However, when the multi-county region identified in SWAP and CWEST differed from those identified in the Affected Environment section of Chapter 19, those identified in the other economic tools were used. For example, Plumas County is included in the Sacramento Valley subregion in the Affected Environment section but it is excluded from the CWEST model's Sacramento Valley region. Thus, Sacramento Valley's IMPLAN model excludes Plumas County. Table 19B.1 lists the counties included in the regions identified in the Affected Environment section of Chapter 19, Socioeconomics, the SWAP model, and the CWEST model.

Table 19B.1 Categorization of Counties within Regions

Region	Categorization in Affected Environment Section of Chapter 19, Socioeconomics	Categorization in the SWAP Model	Categorization in the CWEST Model
Central Valley Region – Sacramento	Shasta Plumas Tehama Glenn Colusa Butte Yuba Nevada Sutter Placer El Dorado	Shasta Tehama Glenn Colusa Butte Yuba Nevada Sutter Placer	El Dorado Napa Placer Sacramento Shasta Solano Sutter Yolo
Central Valley Region – San Joaquin	Stanislaus Madera Merced Fresno Tulare Kings Kern	Stanislaus Madera Merced Fresno Tulare Kings Kern	Fresno Kings Kern San Joaquin Tulare
San Francisco Bay Area	Alameda Santa Clara San Benito Napa	–	Alameda Contra Costa San Benito Santa Clara
Central Coast	San Luis Obispo Santa Barbara	–	San Luis Obispo Santa Barbara
Southern California	Ventura Los Angeles Orange San Diego Riverside San Bernardino	–	Kern Ventura Los Angeles Orange San Diego Riverside San Bernardino

IMPLAN models of each regions were used to estimate the secondary employment and income impacts associated with changes in irrigated agricultural production and M&I water costs. Each regional model follows county lines and incorporates, to the extent allowed by available data, the distinct sector characteristics of the region modeled.

19B.2.3 Assumptions

The primary assumption attributable to IMPLAN concerns linkages among regions. Each of the IMPLAN models is a single-region model. Other than assumptions on imports, exports, and regional purchases, the models do not explicitly recognize inter-regional interdependencies among sectors. It is believed that the regions defined for the IMPLAN models are sufficiently large so that each is relatively self-sufficient as an economic entity.

Incremental changes in agricultural production over the long-term condition (82-year simulation period analyzed in this EIS) were similar (within 5 percent) among Alternatives 1 through 5 as compared to the No Action Alternative, and among the No Action Alternative and Alternatives 1 through 5 as compared to the Second Basis of Comparison. Therefore, no IMPLAN analyses were conducted for regional economic impacts associated with the changes in irrigated agriculture production over the long-term condition. For the analyses of dry and critical dry year conditions, the direct inputs from the SWAP model were used as input into the relevant agricultural sector within each of the regions. Table 19B.2 shows the aggregated crop categories from the SWAP model and the IMPLAN sector to which each of these crop categories was assigned.

Table 19B.2 Mapping SWAP Model Results to IMPLAN Sectors

Crop Category	IMPLAN Sector
Grains	Sector 2 – Grain farming
Field Crops	Sector 10 – All other crop farming
Forage Crops	Sector 10 – All other crop farming
Vegetable, truck	Sector 3 – Vegetables and melon farming
Orchards and Vineyards	Sector 4 – Fruit farming

Because the SWAP model results were in 2010 dollars and the IMPLAN regional economic models were based on the 2012 IMPLAN I-O data, the agricultural revenue changes associated with each alternative as compared to the No Action Alternative and the Second Basis of Comparison were converted to 2012 dollars using the gross domestic product (GDP) deflator.

The long-term average year condition M&I cost estimates out of the CWEST model were used as input into the relevant IMPLAN sector and household category within each of the regions. Because the CWEST model results were in 2014 dollars and the IMPLAN regional economic models were based on the 2012 IMPLAN I-O data, the changes in M&I costs were converted to 2012 dollars using the GDP deflator.

19B.3 IMPLAN Results

This section presents the results of the IMPLAN model runs. Employment estimates out of IMPLAN, which are head counts and thus include both part-time and full-time jobs, were adjusted to full-time equivalents (FTEs) using IMPLAN's ratios for each of the 440 sectors.

19B.3.1 No Action Alternative

As described in Chapter 4, Approach to Environmental Analysis, the No Action Alternative is compared to the Second Basis of Comparison.

Tables 19B.3 and 19B.4 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region in the dry and critical dry years. The income and output estimates are in 2012 dollars.

Tables 19B.5 and 19B.6 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.7 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.8 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.9 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.3.2 Alternative 1 Compared to No Action Alternative

Tables 19B.10 and 19B.11 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region. The income and output estimates are in 2012 dollars.

Tables 19B.12 and 19B.13 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.14 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.15 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.16 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.3.3 Alternative 3 Compared to No Action Alternative

Tables 19B.17 and 19B.18 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region. The income and output estimates are in 2012 dollars.

Tables 19B.19 and 19B.20 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.21 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.22 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.23 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.3.4 Alternative 3 Compared to Second Basis of Comparison

Tables 19B.24 and 19B.25 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region. The income and output estimates are in 2012 dollars.

Tables 19B.26 and 19B.27 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.28 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.29 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.30 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.3.5 Alternative 5 Compared to No Action Alternative

Tables 19B.31 and 19B.32 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region. The income and output estimates are in 2012 dollars.

Tables 19B.33 and 19B.34 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.35 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.36 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.37 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.3.6 Alternative 5 Compared to Second Basis of Comparison

Tables 19B.38 and 19B.39 summarize the regional economic impacts associated with the changes in irrigated agriculture production in the Central Valley Region. The income and output estimates are in 2012 dollars.

Tables 19B.40 and 19B.41 summarize the regional economic impacts associated with the changes in M&I water supply costs in the Central Valley Region. The income and output estimates are in 2012 dollars.

Table 19B.42 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the San Francisco Bay Area Region. The income and output estimates are in 2012 dollars.

Table 19B.43 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Central Coast Region. The income and output estimates are in 2012 dollars.

Table 19B.44 summarizes the regional economic impacts associated with the changes in M&I water supply costs in the Southern California Region. The income and output estimates are in 2012 dollars.

19B.4 References

IMPLAN Group, LLC, IMPLAN System (data and software), 16740 Birkdale Commons Parkway, Suite 206, Huntersville, NC 28078 www.IMPLAN.com.

Table 19B.3 Changes in Agricultural-related Regional Economic Impacts for the Sacramento Valley under the No Action Alternative as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-87	-21	0	-108	-2.7	-0.8	0.0	-3.5	-11.3	-1.3	0.0	-12.7
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.2
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Transportation, Warehousing & Utilities	0	-1	0	-2	0.0	-0.1	0.0	-0.1	0.0	-0.4	-0.1	-0.5
Wholesale Trade	0	-1	-1	-2	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.3
Retail Trade	0	0	-4	-4	0.0	0.0	-0.2	-0.2	0.0	0.0	-0.3	-0.3
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-7	-2	-9	0.0	-0.2	-0.1	-0.3	0.0	-1.6	-0.8	-2.5
Services	0	-3	-12	-15	0.0	-0.1	-0.5	-0.7	0.0	-0.3	-1.0	-1.3
Government	0	0	0	0	0.0	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1
Total	**-87**	**-36**	**-19**	**-142**	**-2.7**	**-1.5**	**-0.9**	**-5.1**	**-11.3**	**-4.2**	**-2.5**	**-18.1**

Note:

* In 2012 dollars.

Table 19B.4 Changes in Agricultural-related Regional Economic Impacts for the San Joaquin Valley under the No Action Alternative as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-139	-53	0	-192	-5.2	-1.9	0.0	-7.1	-20.3	-2.3	-0.1	-22.7
Mining & Logging	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.3	0.0	-0.3
Construction	0	-2	0	-2	0.0	-0.1	0.0	-0.1	0.0	-0.2	0.0	-0.2
Manufacturing	0	-1	0	-2	0.0	-0.1	0.0	-0.1	0.0	-1.8	-0.3	-2.1
Transportation, Warehousing & Utilities	0	-3	-1	-4	0.0	-0.2	-0.1	-0.3	0.0	-0.8	-0.2	-1.0
Wholesale Trade	0	-2	-1	-3	0.0	-0.1	-0.1	-0.2	0.0	-0.4	-0.2	-0.5
Retail Trade	0	0	-7	-8	0.0	0.0	-0.3	-0.3	0.0	0.0	-0.6	-0.6
Information	0	0	0	-1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2
Financial Activities	0	-12	-3	-15	0.0	-0.3	-0.1	-0.4	0.0	-2.7	-1.5	-4.1
Services	0	-5	-21	-26	0.0	-0.2	-0.9	-1.2	0.0	-0.5	-1.7	-2.2
Government	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.3
Total	**-139**	**-79**	**-35**	**-254**	**-5.2**	**-3.1**	**-1.6**	**-9.9**	**-20.3**	**-9.2**	**-4.9**	**-34.4**

Note:

* In 2012 dollars.

Table 19B.5 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-0.7	-0.7	0.0	0.1	-1.7	-1.6
Mining & Logging	0	0	0	0	0.0	0.1	0.0	0.1	0.0	0.4	-0.3	0.1
Construction	0	0	0	0	0.0	15.6	-1.4	14.2	0.0	29.0	-2.5	26.5
Manufacturing	0	0	0	0	0.0	0.4	-2.3	-1.9	0.0	3.1	-22.2	-19.1
Transportation, Warehousing & Utilities	1	0	0	1	68.2	0.8	-5.5	63.5	286.4	2.8	-18.0	271.2
Wholesale Trade	0	0	0	0	0.0	0.4	-9.5	-9.1	0.0	1.0	-27.1	-26.1
Retail Trade	0	0	-1	-1	0.0	0.5	-23.3	-22.9	0.0	0.9	-46.6	-45.6
Information	0	0	0	0	0.0	0.5	-3.4	-2.9	0.0	3.4	-20.6	-17.2
Financial Activities	0	0	0	0	0.0	2.2	-16.9	-14.7	0.0	13.0	-147.7	-134.6
Services	0	0	-2	-1	0.0	16.8	-86.7	-69.9	0.0	30.8	-154.7	-123.9
Government	0	0	0	0	0.0	0.1	-1.9	-1.8	0.0	0.2	-3.8	-3.7
Total	**1**	**1**	**-3**	**-1**	**68.2**	**37.4**	**-151.8**	**-46.2**	**286.4**	**84.8**	**-445.2**	**-74.0**

Note:

* In 2012 dollars.

Table 19B.6 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-2.2	-2.2	0.0	0.0	-6.7	-6.7
Mining & Logging	0	0	0	0	0.0	-0.1	-2.1	-2.2	0.0	-0.4	-6.4	-6.8
Construction	0	0	0	0	0.0	-7.1	-3.1	-10.1	0.0	-13.3	-5.6	-18.9
Manufacturing	0	0	0	0	0.0	-0.1	-3.8	-3.9	0.0	-1.4	-46.4	-47.8
Transportation, Warehousing & Utilities	-1	0	0	-1	-39.9	-0.3	-11.8	-52.0	-140.8	-1.4	-44.7	-186.9
Wholesale Trade	0	0	0	0	0.0	-0.1	-13.3	-13.4	0.0	-0.4	-39.0	-39.3
Retail Trade	0	0	-1	-1	0.0	-0.2	-48.4	-48.6	0.0	-0.4	-97.4	-97.8
Information	0	0	0	0	0.0	-0.2	-4.9	-5.1	0.0	-1.0	-27.0	-28.0
Financial Activities	0	0	-1	-1	0.0	-0.6	-17.8	-18.4	0.0	-4.3	-263.7	-268.0
Services	0	0	-3	-3	0.0	-6.1	-155.3	-161.4	0.0	-11.7	-292.3	-303.9
Government	0	0	0	0	0.0	-0.1	-6.2	-6.3	0.0	-0.1	-12.9	-13.0
Total	**-1**	**0**	**-6**	**-7**	**-39.9**	**-15.0**	**-268.8**	**-323.6**	**-140.8**	**-34.3**	**-842.0**	**-1,017.2**

Note:
* In 2012 dollars.

Table 19B.7 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-4.1	-4.0	0.0	0.1	-7.9	-7.8
Mining & Logging	0	0	0	0	0.0	0.7	-1.8	-1.1	0.0	1.6	-5.0	-3.4
Construction	0	1	0	1	0.0	96.2	-22.8	73.3	0.0	158.8	-37.1	121.7
Manufacturing	0	0	0	0	0.0	3.1	-51.8	-48.8	0.0	28.8	-478.0	-449.1
Transportation, Warehousing & Utilities	5	0	-1	4	592.5	3.4	-65.0	530.9	1,492.4	11.2	-183.5	1,320.1
Wholesale Trade	0	0	-1	-1	0.0	2.2	-157.8	-155.6	0.0	5.0	-350.6	-345.7
Retail Trade	0	0	-6	-6	0.0	2.3	-306.5	-304.2	0.0	4.2	-567.2	-563.0
Information	0	0	-1	-1	0.0	4.4	-91.6	-87.2	0.0	16.8	-306.6	-289.8
Financial Activities	0	0	-5	-4	0.0	11.9	-218.8	-206.8	0.0	55.8	-1,740.5	-1,684.7
Services	0	1	-20	-19	0.0	84.3	-1,321.5	-1,237.2	0.0	133.7	-2,162.8	-2,029.1
Government	0	0	0	0	0.0	0.4	-30.5	-30.1	0.0	0.7	-55.1	-54.4
Total	**5**	**3**	**-35**	**-27**	**592.5**	**208.9**	**-2,272.2**	**-1,470.8**	**1,492.4**	**416.7**	**-5,894.3**	**-3,985.2**

Note:

* In 2012 dollars.

Table 19B.8 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.2	-2.2	-2.0	0.0	0.6	-4.0	-3.4
Mining & Logging	0	0	0	0	0.0	1.8	-2.1	-0.3	0.0	6.4	-9.3	-2.9
Construction	0	2	0	2	0.0	106.3	-5.4	100.8	0.0	201.9	-9.7	192.2
Manufacturing	0	0	0	0	0.0	1.6	-2.7	-1.1	0.0	26.8	-51.8	-25.0
Transportation, Warehousing & Utilities	6	0	0	6	371.2	3.8	-13.4	361.6	1,510.8	17.0	-56.2	1,471.6
Wholesale Trade	0	0	0	0	0.0	1.7	-20.2	-18.5	0.0	4.8	-58.6	-53.8
Retail Trade	0	0	-1	-1	0.0	3.2	-61.0	-57.8	0.0	6.1	-118.5	-112.4
Information	0	0	0	0	0.0	2.3	-9.0	-6.7	0.0	12.0	-39.0	-27.0
Financial Activities	0	0	-1	-1	0.0	11.8	-29.8	-18.0	0.0	68.9	-352.0	-283.2
Services	0	2	-5	-3	0.0	88.9	-243.3	-154.5	0.0	167.1	-447.4	-280.3
Government	0	0	0	0	0.0	0.5	-6.7	-6.2	0.0	0.9	-13.2	-12.3
Total	**6**	**4**	**-8**	**2**	**371.2**	**222.1**	**-395.9**	**197.4**	**1,510.8**	**512.7**	**-1,159.9**	**863.6**

Note:

* In 2012 dollars.

Table 19B.9 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	2	1	0.0	-4.5	126.9	122.4	0.0	-12.5	272.7	260.2
Mining & Logging	0	-1	1	1	0.0	-49.2	98.7	49.5	0.0	-164.2	369.0	204.8
Construction	0	-43	3	-40	0.0	-2,828.3	222.0	-2,606.3	0.0	-5,205.5	395.5	-4,810.0
Manufacturing	0	-2	10	8	0.0	-180.9	803.4	622.5	0.0	-1,452.6	6,814.5	5,361.9
Transportation, Warehousing & Utilities	-175	-2	12	-166	-12,868.2	-164.5	820.7	-12,212.1	-43,673.4	-592.0	2,602.9	-41,662.5
Wholesale Trade	0	-1	20	19	0.0	-102.7	1,618.8	1,516.1	0.0	-275.3	4,339.0	4,063.8
Retail Trade	0	-2	58	56	0.0	-89.5	2,588.4	2,498.8	0.0	-170.6	5,106.3	4,935.7
Information	0	-1	6	5	0.0	-140.2	752.3	612.1	0.0	-637.5	2,962.1	2,324.6
Financial Activities	0	-9	52	43	0.0	-573.3	2,853.6	2,280.3	0.0	-2,528.7	17,797.9	15,269.1
Services	0	-46	212	166	0.0	-3,269.1	11,460.9	8,191.7	0.0	-5,542.2	20,430.6	14,888.4
Government	0	0	3	3	0.0	-17.1	306.1	289.0	0.0	-29.8	587.3	557.5
Total	**-175**	**-108**	**378**	**95**	**-12,868.2**	**-7,419.5**	**21,651.7**	**1,364.0**	**-43,673.4**	**-16,611.0**	**61,677.8**	**1,393.5**

Note:

* In 2012 dollars.

Table 19B.10 Changes in Agricultural-related Regional Economic Impacts for the Sacramento Valley under Alternative 1 as Compared to No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions) *				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	87	21	0	108	2.7	0.8	0.0	3.5	11.3	1.3	0.0	12.7
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.2
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Transportation, Warehousing & Utilities	0	1	0	2	0.0	0.1	0.0	0.1	0.0	0.4	0.1	0.5
Wholesale Trade	0	1	1	2	0.0	0.1	0.0	0.1	0.0	0.2	0.1	0.3
Retail Trade	0	0	4	4	0.0	0.0	0.2	0.2	0.0	0.0	0.3	0.3
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Financial Activities	0	7	2	9	0.0	0.2	0.1	0.3	0.0	1.6	0.8	2.5
Services	0	3	12	15	0.0	0.1	0.5	0.7	0.0	0.3	1.0	1.3
Government	0	0	0	0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Total	**87**	**36**	**19**	**142**	**2.7**	**1.5**	**0.9**	**5.1**	**11.3**	**4.2**	**2.5**	**18.1**

Note:

* In 2012 dollars.

Table 19B.11 Changes in Agricultural-related Regional Economic Impacts for the San Joaquin Valley under Alternative 1 as Compared to No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	139	53	0	192	5.2	1.9	0.0	7.1	20.3	2.3	0.1	22.7
Mining & Logging	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.3	0.0	0.3
Construction	0	2	0	2	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.2
Manufacturing	0	1	0	2	0.0	0.1	0.0	0.1	0.0	1.8	0.3	2.1
Transportation, Warehousing & Utilities	0	3	1	4	0.0	0.2	0.1	0.3	0.0	0.8	0.2	1.0
Wholesale Trade	0	2	1	3	0.0	0.1	0.1	0.2	0.0	0.4	0.2	0.5
Retail Trade	0	0	7	8	0.0	0.0	0.3	0.3	0.0	0.0	0.6	0.6
Information	0	0	0	1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Financial Activities	0	12	3	15	0.0	0.3	0.1	0.4	0.0	2.7	1.5	4.1
Services	0	5	21	26	0.0	0.2	0.9	1.2	0.0	0.5	1.7	2.2
Government	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.2	0.1	0.3
Total	**139**	**79**	**35**	**254**	**5.2**	**3.1**	**1.6**	**9.9**	**20.3**	**9.2**	**4.9**	**34.4**

Note:

* In 2012 dollars.

Table 19B.12 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under Alternative 1 as Compared to No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.7	0.7	0.0	-0.1	1.7	1.6
Mining & Logging	0	0	0	0	0.0	-0.1	0.0	-0.1	0.0	-0.4	0.3	-0.1
Construction	0	0	0	0	0.0	-15.6	1.4	-14.2	0.0	-29.0	2.5	-26.5
Manufacturing	0	0	0	0	0.0	-0.4	2.3	1.9	0.0	-3.1	22.2	19.1
Transportation, Warehousing & Utilities	-1	0	0	-1	-68.2	-0.8	5.5	-63.5	-286.4	-2.8	18.0	-271.2
Wholesale Trade	0	0	0	0	0.0	-0.4	9.5	9.1	0.0	-1.0	27.1	26.1
Retail Trade	0	0	1	1	0.0	-0.5	23.3	22.9	0.0	-0.9	46.6	45.6
Information	0	0	0	0	0.0	-0.5	3.4	2.9	0.0	-3.4	20.6	17.2
Financial Activities	0	0	0	0	0.0	-2.2	16.9	14.7	0.0	-13.0	147.7	134.6
Services	0	0	2	1	0.0	-16.8	86.7	69.9	0.0	-30.8	154.7	123.9
Government	0	0	0	0	0.0	-0.1	1.9	1.8	0.0	-0.2	3.8	3.7
Total	**-1**	**-1**	**3**	**1**	**-68.2**	**-37.4**	**151.8**	**46.2**	**-286.4**	**-84.8**	**445.2**	**74.0**

Note:
* In 2012 dollars.

Table 19B.13 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under Alternative 1 as Compared to No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	2.2	2.2	0.0	0.0	6.7	6.7
Mining & Logging	0	0	0	0	0.0	0.1	2.1	2.2	0.0	0.4	6.4	6.8
Construction	0	0	0	0	0.0	7.1	3.1	10.1	0.0	13.3	5.6	18.9
Manufacturing	0	0	0	0	0.0	0.1	3.8	3.9	0.0	1.4	46.4	47.8
Transportation, Warehousing & Utilities	1	0	0	1	39.9	0.3	11.8	52.0	140.8	1.4	44.7	186.9
Wholesale Trade	0	0	0	0	0.0	0.1	13.3	13.4	0.0	0.4	39.0	39.3
Retail Trade	0	0	1	1	0.0	0.2	48.4	48.6	0.0	0.4	97.4	97.8
Information	0	0	0	0	0.0	0.2	4.9	5.1	0.0	1.0	27.0	28.0
Financial Activities	0	0	1	1	0.0	0.6	17.8	18.4	0.0	4.3	263.7	268.0
Services	0	0	3	3	0.0	6.1	155.3	161.4	0.0	11.7	292.3	303.9
Government	0	0	0	0	0.0	0.1	6.2	6.3	0.0	0.1	12.9	13.0
Total	**1**	**0**	**6**	**7**	**39.9**	**15.0**	**268.8**	**323.6**	**140.8**	**34.3**	**842.0**	**1,017.2**

Note:

* In 2012 dollars.

Table 19B.14 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under Alternative 1 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	4.1	4.0	0.0	-0.1	7.9	7.8
Mining & Logging	0	0	0	0	0.0	-0.7	1.8	1.1	0.0	-1.6	5.0	3.4
Construction	0	-1	0	-1	0.0	-96.2	22.8	-73.3	0.0	-158.8	37.1	-121.7
Manufacturing	0	0	0	0	0.0	-3.1	51.8	48.8	0.0	-28.8	478.0	449.1
Transportation, Warehousing & Utilities	-5	0	1	-4	-592.5	-3.4	65.0	-530.9	-1,492.4	-11.2	183.5	-1,320.1
Wholesale Trade	0	0	1	1	0.0	-2.2	157.8	155.6	0.0	-5.0	350.6	345.7
Retail Trade	0	0	6	6	0.0	-2.3	306.5	304.2	0.0	-4.2	567.2	563.0
Information	0	0	1	1	0.0	-4.4	91.6	87.2	0.0	-16.8	306.6	289.8
Financial Activities	0	0	5	4	0.0	-11.9	218.8	206.8	0.0	-55.8	1,740.5	1,684.7
Services	0	-1	20	19	0.0	-84.3	1,321.5	1,237.2	0.0	-133.7	2,162.8	2,029.1
Government	0	0	0	0	0.0	-0.4	30.5	30.1	0.0	-0.7	55.1	54.4
Total	**-5**	**-3**	**35**	**27**	**-592.5**	**-208.9**	**2,272.2**	**1,470.8**	**-1,492.4**	**-416.7**	**5,894.3**	**3,985.2**

Note:

* In 2012 dollars.

Table 19B.15 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under Alternative 1 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.2	2.2	2.0	0.0	-0.6	4.0	3.4
Mining & Logging	0	0	0	0	0.0	-1.8	2.1	0.3	0.0	-6.4	9.3	2.9
Construction	0	-2	0	-2	0.0	-106.3	5.4	-100.8	0.0	-201.9	9.7	-192.2
Manufacturing	0	0	0	0	0.0	-1.6	2.7	1.1	0.0	-26.8	51.8	25.0
Transportation, Warehousing & Utilities	-6	0	0	-6	-371.2	-3.8	13.4	-361.6	-1,510.8	-17.0	56.2	-1,471.6
Wholesale Trade	0	0	0	0	0.0	-1.7	20.2	18.5	0.0	-4.8	58.6	53.8
Retail Trade	0	0	1	1	0.0	-3.2	61.0	57.8	0.0	-6.1	118.5	112.4
Information	0	0	0	0	0.0	-2.3	9.0	6.7	0.0	-12.0	39.0	27.0
Financial Activities	0	0	1	1	0.0	-11.8	29.8	18.0	0.0	-68.9	352.0	283.2
Services	0	-2	5	3	0.0	-88.9	243.3	154.5	0.0	-167.1	447.4	280.3
Government	0	0	0	0	0.0	-0.5	6.7	6.2	0.0	-0.9	13.2	12.3
Total	**-6**	**-4**	**8**	**-2**	**-371.2**	**-222.1**	**395.9**	**-197.4**	**-1,510.8**	**-512.7**	**1,159.9**	**-863.6**

Note:

* In 2012 dollars.

Table 19B.16 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under Alternative 1 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	-2	-1	0.0	4.5	-126.9	-122.4	0.0	12.5	-272.7	-260.2
Mining & Logging	0	1	-1	-1	0.0	49.2	-98.7	-49.5	0.0	164.2	-369.0	-204.8
Construction	0	43	-3	40	0.0	2,828.3	-222.0	2,606.3	0.0	5,205.5	-395.5	4,810.0
Manufacturing	0	2	-10	-8	0.0	180.9	-803.4	-622.5	0.0	1,452.6	-6,814.5	-5,361.9
Transportation, Warehousing & Utilities	175	2	-12	166	12,868.2	164.5	-820.7	12,212.1	43,673.4	592.0	-2,602.9	41,662.5
Wholesale Trade	0	1	-20	-19	0.0	102.7	-1,618.8	-1,516.1	0.0	275.3	-4,339.0	-4,063.8
Retail Trade	0	2	-58	-56	0.0	89.5	-2,588.4	-2,498.8	0.0	170.6	-5,106.3	-4,935.7
Information	0	1	-6	-5	0.0	140.2	-752.3	-612.1	0.0	637.5	-2,962.1	-2,324.6
Financial Activities	0	9	-52	-43	0.0	573.3	-2,853.6	-2,280.3	0.0	2,528.7	-17,797.9	-15,269.1
Services	0	46	-212	-166	0.0	3,269.1	-11,460.9	-8,191.7	0.0	5,542.2	-20,430.6	-14,888.4
Government	0	0	-3	-3	0.0	17.1	-306.1	-289.0	0.0	29.8	-587.3	-557.5
Total	**175**	**108**	**-378**	**-95**	**12,868.2**	**7,419.5**	**-21,651.7**	**-1,364.0**	**43,673.4**	**16,611.0**	**-61,677.8**	**-1,393.5**

Note:
* In 2012 dollars.

Table 19B.17 Changes in Agricultural-related Regional Economic Impacts for the Sacramento Valley under Alternative 3 as Compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	69	18	0	86	2.4	0.7	0.0	3.1	9.2	1.1	0.0	10.3
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Transportation, Warehousing & Utilities	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.3	0.1	0.4
Wholesale Trade	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.2	0.1	0.3
Retail Trade	0	0	3	3	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.3
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Financial Activities	0	5	2	7	0.0	0.2	0.1	0.3	0.0	1.3	0.7	2.0
Services	0	3	10	13	0.0	0.1	0.5	0.6	0.0	0.2	0.9	1.1
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Total	**69**	**29**	**17**	**115**	**2.4**	**1.2**	**0.8**	**4.4**	**9.2**	**3.4**	**2.2**	**14.8**

Note:

* In 2012 dollars.

Table 19B.18 Changes in Agricultural-related Regional Economic Impacts for the San Joaquin Valley under Alternative 3 as Compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	103	26	0	130	1.8	0.9	0.0	2.7	11.4	1.2	0.0	12.7
Mining & Logging	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.2
Construction	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1
Manufacturing	0	1	0	1	0.0	0.1	0.0	0.1	0.0	1.2	0.1	1.3
Transportation, Warehousing & Utilities	0	2	0	2	0.0	0.1	0.0	0.2	0.0	0.5	0.1	0.6
Wholesale Trade	0	1	0	1	0.0	0.1	0.0	0.1	0.0	0.2	0.1	0.3
Retail Trade	0	0	3	3	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.3
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Financial Activities	0	8	1	10	0.0	0.2	0.0	0.2	0.0	1.8	0.6	2.5
Services	0	3	9	12	0.0	0.1	0.4	0.5	0.0	0.3	0.7	1.0
Government	0	0	0	1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Total	**103**	**44**	**15**	**161**	**1.8**	**1.7**	**0.7**	**4.2**	**11.4**	**5.7**	**2.1**	**19.1**

Note:
* In 2012 dollars.

Table 19B.19 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under Alternative 3 as Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-0.5	-0.5	0.0	0.1	-1.2	-1.1
Mining & Logging	0	0	0	0	0.0	0.1	0.0	0.1	0.0	0.4	-0.2	0.2
Construction	0	0	0	0	0.0	13.9	-1.0	12.8	0.0	25.8	-1.8	23.9
Manufacturing	0	0	0	0	0.0	0.4	-1.7	-1.4	0.0	2.8	-16.2	-13.5
Transportation, Warehousing & Utilities	1	0	0	1	60.6	0.7	-4.0	57.2	254.4	2.5	-13.1	243.7
Wholesale Trade	0	0	0	0	0.0	0.3	-7.0	-6.6	0.0	0.9	-20.0	-19.1
Retail Trade	0	0	0	0	0.0	0.4	-17.0	-16.5	0.0	0.8	-33.8	-33.0
Information	0	0	0	0	0.0	0.5	-2.5	-2.0	0.0	3.0	-15.1	-12.1
Financial Activities	0	0	0	0	0.0	2.0	-12.3	-10.3	0.0	11.6	-107.7	-96.1
Services	0	0	-1	-1	0.0	14.9	-63.3	-48.3	0.0	27.4	-112.8	-85.4
Government	0	0	0	0	0.0	0.1	-1.4	-1.3	0.0	0.1	-2.8	-2.7
Total	**1**	**1**	**-2**	**0**	**60.6**	**33.3**	**-110.7**	**-16.9**	**254.4**	**75.3**	**-324.8**	**4.9**

Note:

* In 2012 dollars.

Table 19B.20 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under Alternative 3 as Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	-3.0	-3.0	0.0	-0.2	-8.9	-9.1
Mining & Logging	0	0	0	0	0.0	-0.4	-2.7	-3.1	0.0	-1.2	-8.5	-9.7
Construction	0	0	0	0	0.0	-23.0	-4.1	-27.1	0.0	-43.3	-7.4	-50.7
Manufacturing	0	0	0	0	0.0	-0.4	-5.0	-5.4	0.0	-4.4	-62.0	-66.3
Transportation, Warehousing & Utilities	-2	0	0	-2	-129.6	-1.1	-15.7	-146.4	-457.3	-4.4	-59.6	-521.3
Wholesale Trade	0	0	0	0	0.0	-0.4	-17.6	-18.0	0.0	-1.2	-51.6	-52.8
Retail Trade	0	0	-2	-2	0.0	-0.7	-64.9	-65.6	0.0	-1.3	-130.7	-132.0
Information	0	0	0	0	0.0	-0.5	-6.6	-7.1	0.0	-3.2	-36.0	-39.2
Financial Activities	0	0	-1	-1	0.0	-2.1	-23.7	-25.8	0.0	-14.1	-352.2	-366.3
Services	0	0	-5	-5	0.0	-19.9	-207.7	-227.6	0.0	-38.0	-391.1	-429.1
Government	0	0	0	0	0.0	-0.2	-8.3	-8.5	0.0	-0.3	-17.2	-17.5
Total	**-2**	**-1**	**-8**	**-11**	**-129.6**	**-48.6**	**-359.4**	**-537.5**	**-457.3**	**-111.6**	**-1,125.2**	**-1,694.1**

Note:

* In 2012 dollars.

Table 19B.21 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under Alternative 3 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)=			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-3.1	-3.1	0.0	0.1	-6.0	-5.9
Mining & Logging	0	0	0	0	0.0	0.8	-1.3	-0.5	0.0	1.9	-3.8	-1.9
Construction	0	1	0	1	0.0	113.1	-17.3	95.7	0.0	186.7	-28.2	158.6
Manufacturing	0	0	0	0	0.0	3.6	-39.4	-35.8	0.0	33.9	-363.5	-329.6
Transportation, Warehousing & Utilities	6	0	-1	5	696.6	3.9	-49.2	651.3	1,754.5	13.2	-139.1	1,628.6
Wholesale Trade	0	0	-1	-1	0.0	2.6	-120.9	-118.3	0.0	5.8	-268.7	-262.9
Retail Trade	0	0	-5	-5	0.0	2.7	-231.6	-228.9	0.0	4.9	-428.6	-423.7
Information	0	0	0	0	0.0	5.2	-69.6	-64.4	0.0	19.8	-233.1	-213.4
Financial Activities	0	0	-3	-3	0.0	14.0	-165.9	-151.8	0.0	65.6	-1,320.3	-1,254.7
Services	0	1	-15	-14	0.0	99.2	-1,001.8	-902.7	0.0	157.2	-1,639.6	-1,482.4
Government	0	0	0	0	0.0	0.5	-23.1	-22.6	0.0	0.8	-41.8	-41.0
Total	**6**	**3**	**-26**	**-17**	**696.6**	**245.6**	**-1,723.3**	**-781.1**	**1,754.5**	**489.9**	**-4,472.7**	**-2,228.3**

Note:

* In 2012 dollars.

Table 19B.22 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under Alternative 3 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.2	-1.6	-1.4	0.0	0.4	-2.8	-2.4
Mining & Logging	0	0	0	0	0.0	1.4	-1.5	-0.1	0.0	4.9	-6.5	-1.7
Construction	0	1	0	1	0.0	80.9	-3.8	77.1	0.0	153.8	-6.8	147.0
Manufacturing	0	0	0	0	0.0	1.2	-1.9	-0.6	0.0	20.4	-36.5	-16.0
Transportation, Warehousing & Utilities	5	0	0	5	282.7	2.9	-9.4	276.2	1,150.6	13.0	-39.5	1,124.0
Wholesale Trade	0	0	0	0	0.0	1.3	-14.3	-13.0	0.0	3.7	-41.4	-37.8
Retail Trade	0	0	-1	-1	0.0	2.5	-42.8	-40.3	0.0	4.7	-83.0	-78.4
Information	0	0	0	0	0.0	1.8	-6.3	-4.6	0.0	9.1	-27.4	-18.3
Financial Activities	0	0	-1	0	0.0	9.0	-20.9	-11.9	0.0	52.5	-247.3	-194.8
Services	0	1	-3	-2	0.0	67.7	-170.9	-103.2	0.0	127.3	-314.2	-186.9
Government	0	0	0	0	0.0	0.4	-4.7	-4.3	0.0	0.7	-9.3	-8.6
Total	**5**	**3**	**-6**	**2**	**282.7**	**169.1**	**-278.0**	**173.8**	**1,150.6**	**390.4**	**-814.8**	**726.2**

Note:

* In 2012 dollars.

Table 19B.23 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under Alternative 3 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	-1	-1	0.0	3.8	-68.1	-64.3	0.0	10.5	-146.4	-135.8
Mining & Logging	0	1	-1	0	0.0	41.5	-53.4	-12.0	0.0	138.6	-199.8	-61.2
Construction	0	37	-2	35	0.0	2,386.1	-118.9	2,267.2	0.0	4,391.6	-211.9	4,179.8
Manufacturing	0	2	-6	-3	0.0	152.6	-430.4	-277.8	0.0	1,225.5	-3,662.5	-2,437.0
Transportation, Warehousing & Utilities	148	2	-6	143	10,856.3	138.8	-437.2	10,557.9	36,845.0	499.5	-1,389.7	35,954.8
Wholesale Trade	0	1	-11	-10	0.0	86.6	-897.5	-810.8	0.0	232.2	-2,405.6	-2,173.3
Retail Trade	0	2	-31	-29	0.0	75.5	-1,362.6	-1,287.1	0.0	143.9	-2,688.1	-2,544.2
Information	0	1	-3	-2	0.0	118.3	-403.7	-285.4	0.0	537.8	-1,595.7	-1,057.9
Financial Activities	0	7	-28	-20	0.0	483.7	-1,519.6	-1,035.9	0.0	2,133.4	-9,496.1	-7,362.8
Services	0	39	-113	-74	0.0	2,758.0	-6,109.8	-3,351.8	0.0	4,675.7	-10,892.2	-6,216.5
Government	0	0	-2	-1	0.0	14.4	-163.2	-148.8	0.0	25.1	-314.7	-289.6
Total	**148**	**91**	**-202**	**37**	**10,856.3**	**6,259.4**	**-11,564.4**	**5,551.3**	**36,845.0**	**14,013.9**	**-33,002.7**	**17,856.2**

Note:

* In 2012 dollars.

Table 19B.24 Changes in Agricultural-related Regional Economic Impacts for the Sacramento Valley under Alternative 3 as Compared to Second Basis of the Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-18	-4	0	-22	-0.3	-0.1	0.0	-0.4	-2.1	-0.2	0.0	-2.3
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transportation, Warehousing & Utilities	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Retail Trade	0	0	0	-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financial Activities	0	-2	0	-2	0.0	-0.1	0.0	-0.1	0.0	-0.4	-0.1	-0.5
Services	0	-1	-1	-2	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.2
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**-18**	**-7**	**-2**	**-27**	**-0.3**	**-0.3**	**-0.1**	**-0.6**	**-2.1**	**-0.9**	**-0.3**	**-3.3**

Note:

* In 2012 dollars.

Table 19B.25 Changes in Agricultural-related Regional Economic Impacts for the San Joaquin Valley under Alternative 3 as Compared to Second Basis of the Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-36	-26	0	-63	-3.4	-0.9	0.0	-4.4	-8.9	-1.1	0.0	-10.0
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Construction	0	-1	0	-1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Manufacturing	0	0	0	-1	0.0	0.0	0.0	-0.1	0.0	-0.7	-0.2	-0.8
Transportation, Warehousing & Utilities	0	-1	-1	-2	0.0	-0.1	0.0	-0.1	0.0	-0.3	-0.1	-0.5
Wholesale Trade	0	-1	-1	-1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.2
Retail Trade	0	0	-4	-4	0.0	0.0	-0.2	-0.2	0.0	0.0	-0.4	-0.4
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-4	-2	-5	0.0	-0.1	-0.1	-0.2	0.0	-0.8	-0.9	-1.7
Services	0	-2	-12	-14	0.0	-0.1	-0.5	-0.6	0.0	-0.2	-1.0	-1.2
Government	0	0	0	0	0.0	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1
Total	**-36**	**-36**	**-20**	**-92**	**-3.4**	**-1.4**	**-0.9**	**-5.8**	**-8.9**	**-3.5**	**-2.8**	**-15.3**

Note:

* In 2012 dollars.

Table 19B.26 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.2	0.2	0.0	0.0	0.5	0.5
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Construction	0	0	0	0	0.0	-1.9	0.4	-1.5	0.0	-3.5	0.7	-2.8
Manufacturing	0	0	0	0	0.0	0.0	0.7	0.6	0.0	-0.4	6.4	6.0
Transportation, Warehousing & Utilities	0	0	0	0	-8.2	-0.1	1.6	-6.7	-34.6	-0.3	5.2	-29.7
Wholesale Trade	0	0	0	0	0.0	0.0	2.7	2.6	0.0	-0.1	7.7	7.6
Retail Trade	0	0	0	0	0.0	-0.1	6.8	6.8	0.0	-0.1	13.6	13.5
Information	0	0	0	0	0.0	-0.1	1.0	0.9	0.0	-0.4	6.0	5.5
Financial Activities	0	0	0	0	0.0	-0.3	4.9	4.6	0.0	-1.6	42.9	41.3
Services	0	0	0	0	0.0	-2.0	25.2	23.2	0.0	-3.7	45.0	41.2
Government	0	0	0	0	0.0	0.0	0.6	0.6	0.0	0.0	1.1	1.1
Total	**0**	**0**	**1**	**1**	**-8.2**	**-4.5**	**44.1**	**31.4**	**-34.6**	**-10.2**	**129.2**	**84.4**

Note:

* In 2012 dollars.

Table 19B.27 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-0.7	-0.8	0.0	-0.1	-2.3	-2.4
Mining & Logging	0	0	0	0	0.0	-0.3	-0.7	-1.0	0.0	-0.8	-2.1	-3.0
Construction	0	0	0	0	0.0	-15.9	-1.0	-16.9	0.0	-29.9	-1.9	-31.8
Manufacturing	0	0	0	0	0.0	-0.3	-1.3	-1.5	0.0	-3.0	-15.5	-18.6
Transportation, Warehousing & Utilities	-1	0	0	-1	-89.5	-0.8	-4.0	-94.2	-315.8	-3.0	-14.9	-333.7
Wholesale Trade	0	0	0	0	0.0	-0.3	-4.3	-4.6	0.0	-0.8	-12.7	-13.5
Retail Trade	0	0	0	0	0.0	-0.5	-16.6	-17.0	0.0	-0.9	-33.4	-34.3
Information	0	0	0	0	0.0	-0.4	-1.6	-2.0	0.0	-2.2	-9.0	-11.2
Financial Activities	0	0	0	0	0.0	-1.4	-5.9	-7.4	0.0	-9.7	-88.6	-98.4
Services	0	0	-1	-1	0.0	-13.7	-52.5	-66.2	0.0	-26.2	-99.0	-125.2
Government	0	0	0	0	0.0	-0.1	-2.1	-2.2	0.0	-0.2	-4.3	-4.5
Total	**-1**	**-1**	**-2**	**-4**	**-89.5**	**-33.5**	**-90.7**	**-213.7**	**-315.8**	**-77.0**	**-283.5**	**-676.3**

Note:

* In 2012 dollars.

Table 19B.28 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under Alternative 3 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	1.0	1.0	0.0	0.0	1.9	1.9
Mining & Logging	0	0	0	0	0.0	0.1	0.4	0.5	0.0	0.3	1.2	1.5
Construction	0	0	0	0	0.0	16.9	5.5	22.4	0.0	28.0	9.0	36.9
Manufacturing	0	0	0	0	0.0	0.5	12.5	13.0	0.0	5.1	114.4	119.5
Transportation, Warehousing & Utilities	1	0	0	1	104.3	0.6	15.7	120.6	262.6	2.0	44.3	308.9
Wholesale Trade	0	0	0	0	0.0	0.4	36.9	37.3	0.0	0.9	81.9	82.8
Retail Trade	0	0	2	2	0.0	0.4	74.9	75.3	0.0	0.7	138.5	139.3
Information	0	0	0	0	0.0	0.8	22.0	22.8	0.0	3.0	73.5	76.4
Financial Activities	0	0	1	1	0.0	2.1	52.9	55.0	0.0	9.8	420.2	430.0
Services	0	0	5	5	0.0	14.8	319.7	334.5	0.0	23.5	523.1	546.7
Government	0	0	0	0	0.0	0.1	7.4	7.4	0.0	0.1	13.3	13.4
Total	**1**	**0**	**8**	**10**	**104.3**	**36.8**	**548.8**	**689.8**	**262.6**	**73.3**	**1,421.3**	**1,757.2**

Note:

* In 2012 dollars.

Table 19B.29 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under Alternative 3 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	0.7	0.6	0.0	-0.1	1.2	1.0
Mining & Logging	0	0	0	0	0.0	-0.4	0.6	0.2	0.0	-1.5	2.8	1.2
Construction	0	0	0	0	0.0	-25.3	1.6	-23.7	0.0	-48.1	2.9	-45.2
Manufacturing	0	0	0	0	0.0	-0.4	0.8	0.4	0.0	-6.4	15.4	9.0
Transportation, Warehousing & Utilities	-2	0	0	-2	-88.4	-0.9	4.0	-85.3	-359.9	-4.1	16.7	-347.2
Wholesale Trade	0	0	0	0	0.0	-0.4	5.9	5.5	0.0	-1.2	17.2	16.1
Retail Trade	0	0	0	0	0.0	-0.8	18.3	17.5	0.0	-1.5	35.5	34.1
Information	0	0	0	0	0.0	-0.6	2.7	2.1	0.0	-2.9	11.6	8.8
Financial Activities	0	0	0	0	0.0	-2.8	8.9	6.1	0.0	-16.4	104.9	88.5
Services	0	0	1	1	0.0	-21.2	72.5	51.4	0.0	-39.8	133.4	93.6
Government	0	0	0	0	0.0	-0.1	2.0	1.9	0.0	-0.2	3.9	3.7
Total	**-2**	**-1**	**2**	**0**	**-88.4**	**-52.9**	**118.0**	**-23.3**	**-359.9**	**-122.1**	**345.5**	**-136.5**

Note:

* In 2012 dollars.

Table 19B.30 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under Alternative 3 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	1	1	0.0	-0.7	58.8	58.1	0.0	-2.0	126.3	124.4
Mining & Logging	0	0	1	0	0.0	-7.7	45.3	37.6	0.0	-25.7	169.2	143.5
Construction	0	-7	1	-5	0.0	-442.2	103.1	-339.1	0.0	-813.9	183.7	-630.2
Manufacturing	0	0	5	4	0.0	-28.3	373.0	344.7	0.0	-227.1	3,152.0	2,924.9
Transportation, Warehousing & Utilities	-27	0	5	-22	-2,011.9	-25.7	383.5	-1,654.2	-6,828.3	-92.6	1,213.1	-5,707.8
Wholesale Trade	0	0	9	9	0.0	-16.1	721.4	705.3	0.0	-43.0	1,933.5	1,890.4
Retail Trade	0	0	27	27	0.0	-14.0	1,225.7	1,211.7	0.0	-26.7	2,418.2	2,391.5
Information	0	0	3	3	0.0	-21.9	348.6	326.7	0.0	-99.7	1,366.4	1,266.7
Financial Activities	0	-1	24	23	0.0	-89.6	1,334.0	1,244.4	0.0	-395.4	8,301.7	7,906.3
Services	0	-7	99	92	0.0	-511.1	5,351.1	4,839.9	0.0	-866.5	9,538.4	8,671.9
Government	0	0	1	1	0.0	-2.7	142.9	140.2	0.0	-4.7	272.6	268.0
Total	**-27**	**-17**	**177**	**132**	**-2,011.9**	**-1,160.0**	**10,087.3**	**6,915.3**	**-6,828.3**	**-2,597.1**	**28,675.1**	**19,249.7**

Note:
* In 2012 dollars.

Table 19B.31 Changes in Agricultural-related Regional Economic Impacts for the Sacramento Valley under Alternative 5 as Compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	3	2	0	4	0.4	0.1	0.0	0.4	0.8	0.1	0.0	0.9
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transportation, Warehousing & Utilities	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Retail Trade	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financial Activities	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Services	0	0	1	2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**3**	**2**	**2**	**7**	**0.4**	**0.1**	**0.1**	**0.6**	**0.8**	**0.2**	**0.3**	**1.3**

Note:

* In 2012 dollars.

Table 19B.32 Changes in Agricultural-related Regional Economic Impacts for the San Joaquin Valley under Alternative 5 as Compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-5	-9	0	-14	-1.3	-0.3	0.0	-1.6	-2.7	-0.4	0.0	-3.0
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2
Transportation, Warehousing & Utilities	0	0	0	-1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Retail Trade	0	0	-2	-2	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financial Activities	0	-1	-1	-1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.5
Services	0	-1	-4	-5	0.0	0.0	-0.2	-0.2	0.0	-0.1	-0.4	-0.4
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**-5**	**-11**	**-7**	**-24**	**-1.3**	**-0.4**	**-0.3**	**-2.1**	**-2.7**	**-0.9**	**-1.0**	**-4.6**

Note:

* In 2012 dollars.

Table 19B.33 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under Alternative 5 as Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	-0.4	0.0	-0.4	0.0	-0.8	0.1	-0.7
Manufacturing	0	0	0	0	0.0	0.0	0.1	0.0	0.0	-0.1	0.6	0.5
Transportation, Warehousing & Utilities	0	0	0	0	-1.8	0.0	0.1	-1.7	-7.8	-0.1	0.5	-7.4
Wholesale Trade	0	0	0	0	0.0	0.0	0.2	0.2	0.0	0.0	0.7	0.7
Retail Trade	0	0	0	0	0.0	0.0	0.6	0.6	0.0	0.0	1.2	1.1
Information	0	0	0	0	0.0	0.0	0.1	0.1	0.0	-0.1	0.5	0.4
Financial Activities	0	0	0	0	0.0	-0.1	0.4	0.4	0.0	-0.4	3.7	3.4
Services	0	0	0	0	0.0	-0.5	2.2	1.7	0.0	-0.8	3.9	3.0
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total	**0**	**0**	**0**	**0**	**-1.8**	**-1.0**	**3.8**	**0.9**	**-7.8**	**-2.3**	**11.2**	**1.1**

Note:
* In 2012 dollars.

Table 19B.34 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under Alternative 5 as Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.2	0.3	0.0	0.1	0.7	0.8
Mining & Logging	0	0	0	0	0.0	0.1	0.2	0.3	0.0	0.4	0.7	1.0
Construction	0	0	0	0	0.0	7.4	0.3	7.7	0.0	13.9	0.6	14.5
Manufacturing	0	0	0	0	0.0	0.1	0.4	0.5	0.0	1.4	4.8	6.2
Transportation, Warehousing & Utilities	1	0	0	1	41.5	0.4	1.2	43.1	146.6	1.4	4.6	152.6
Wholesale Trade	0	0	0	0	0.0	0.1	1.3	1.4	0.0	0.4	3.9	4.3
Retail Trade	0	0	0	0	0.0	0.2	5.2	5.5	0.0	0.4	10.6	11.0
Information	0	0	0	0	0.0	0.2	0.5	0.7	0.0	1.0	2.8	3.8
Financial Activities	0	0	0	0	0.0	0.7	1.8	2.5	0.0	4.5	27.7	32.3
Services	0	0	0	0	0.0	6.4	16.5	22.8	0.0	12.2	31.1	43.3
Government	0	0	0	0	0.0	0.1	0.7	0.7	0.0	0.1	1.3	1.5
Total	**1**	**0**	**1**	**1**	**41.5**	**15.6**	**28.5**	**85.6**	**146.6**	**35.8**	**88.8**	**271.2**

Note:
* In 2012 dollars.

Table 19B.35 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under Alternative 5 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.3	0.3	0.0	0.0	0.5	0.5
Mining & Logging	0	0	0	0	0.0	-0.1	0.1	0.0	0.0	-0.2	0.3	0.1
Construction	0	0	0	0	0.0	-10.5	1.5	-9.0	0.0	-17.4	2.4	-15.0
Manufacturing	0	0	0	0	0.0	-0.3	3.3	3.0	0.0	-3.2	30.9	27.8
Transportation, Warehousing & Utilities	-1	0	0	-1	-64.8	-0.4	4.2	-60.9	-163.1	-1.2	11.8	-152.5
Wholesale Trade	0	0	0	0	0.0	-0.2	10.3	10.1	0.0	-0.5	22.9	22.4
Retail Trade	0	0	0	0	0.0	-0.3	19.7	19.4	0.0	-0.5	36.4	35.9
Information	0	0	0	0	0.0	-0.5	5.9	5.4	0.0	-1.8	19.8	18.0
Financial Activities	0	0	0	0	0.0	-1.3	14.1	12.8	0.0	-6.1	112.3	106.2
Services	0	0	1	1	0.0	-9.2	85.2	75.9	0.0	-14.6	139.4	124.8
Government	0	0	0	0	0.0	0.0	2.0	1.9	0.0	-0.1	3.6	3.5
Total	**-1**	**0**	**2**	**1**	**-64.8**	**-22.8**	**146.5**	**58.9**	**-163.1**	**-45.5**	**380.3**	**171.7**

Note:

* In 2012 dollars.

Table 19B.36 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under Alternative 5 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.2	0.1	0.0	0.0	0.3	0.2
Mining & Logging	0	0	0	0	0.0	-0.1	0.1	0.0	0.0	-0.4	0.6	0.2
Construction	0	0	0	0	0.0	-6.8	0.4	-6.5	0.0	-13.0	0.7	-12.3
Manufacturing	0	0	0	0	0.0	-0.1	0.2	0.1	0.0	-1.7	3.5	1.8
Transportation, Warehousing & Utilities	0	0	0	0	-23.9	-0.2	0.9	-23.2	-97.1	-1.1	3.9	-94.3
Wholesale Trade	0	0	0	0	0.0	-0.1	1.4	1.3	0.0	-0.3	4.0	3.7
Retail Trade	0	0	0	0	0.0	-0.2	4.2	4.0	0.0	-0.4	8.1	7.8
Information	0	0	0	0	0.0	-0.1	0.6	0.5	0.0	-0.8	2.7	1.9
Financial Activities	0	0	0	0	0.0	-0.8	2.0	1.3	0.0	-4.4	24.1	19.7
Services	0	0	0	0	0.0	-5.7	16.7	11.0	0.0	-10.7	30.7	19.9
Government	0	0	0	0	0.0	0.0	0.5	0.4	0.0	-0.1	0.9	0.8
Total	**0**	**0**	**1**	**0**	**-23.9**	**-14.3**	**27.1**	**-11.0**	**-97.1**	**-32.9**	**79.5**	**-50.5**

Note:
* In 2012 dollars.

Table 19B.37 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under Alternative 5 Compared to the No Action Alternative

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.9	1.6	2.5	0.0	2.5	3.3	5.9
Mining & Logging	0	0	0	0	0.0	9.9	0.9	10.8	0.0	33.1	3.3	36.4
Construction	0	9	0	9	0.0	570.2	2.9	573.1	0.0	1,049.4	5.1	1,054.5
Manufacturing	0	0	0	1	0.0	36.5	10.4	46.9	0.0	292.8	80.2	373.0
Transportation, Warehousing & Utilities	35	0	0	36	2,594.1	33.2	12.3	2,639.6	8,804.2	119.3	37.0	8,960.5
Wholesale Trade	0	0	0	0	0.0	20.7	-0.1	20.6	0.0	55.5	-0.2	55.3
Retail Trade	0	0	1	2	0.0	18.1	50.3	68.4	0.0	34.4	99.3	133.7
Information	0	0	0	0	0.0	28.3	9.3	37.6	0.0	128.5	32.2	160.8
Financial Activities	0	2	1	2	0.0	115.6	43.4	158.9	0.0	509.8	257.7	767.4
Services	0	9	3	13	0.0	659.0	169.6	828.6	0.0	1,117.3	301.8	1,419.1
Government	0	0	0	0	0.0	3.5	4.5	8.0	0.0	6.0	7.6	13.6
Total	**35**	**22**	**6**	**63**	**2,594.1**	**1,495.7**	**305.1**	**4,394.9**	**8,804.2**	**3,348.6**	**827.3**	**12,980.1**

Note:

* In 2012 dollars.

Table 19B.38 Changes in Agricultural-Related Regional Economic Impacts for the Sacramento Valley under Alternative 5 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-84	-20	0	-104	-2.3	-0.8	0.0	-3.1	-10.5	-1.2	0.0	-11.8
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Transportation, Warehousing & Utilities	0	-1	0	-2	0.0	-0.1	0.0	-0.1	0.0	-0.3	-0.1	-0.5
Wholesale Trade	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.3
Retail Trade	0	0	-3	-4	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.3	-0.3
Information	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-7	-2	-8	0.0	-0.2	-0.1	-0.3	0.0	-1.6	-0.7	-2.3
Services	0	-3	-10	-13	0.0	-0.1	-0.5	-0.6	0.0	-0.3	-0.9	-1.1
Government	0	0	0	0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
Total	**-84**	**-34**	**-17**	**-135**	**-2.3**	**-1.4**	**-0.8**	**-4.5**	**-10.5**	**-4.0**	**-2.2**	**-16.8**

Note:
* In 2012 dollars.

Table 19B.39 Changes in Agricultural-Related Regional Economic Impacts for the San Joaquin Valley under Alternative 5 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Labor Income ($ millions)*				Economic Output ($ millions)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-145	-61	0	-206	-6.5	-2.2	0.0	-8.7	-22.9	-2.7	-0.1	-25.7
Mining & Logging	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.3	0.0	-0.4
Construction	0	-2	0	-2	0.0	-0.1	0.0	-0.1	0.0	-0.2	0.0	-0.2
Manufacturing	0	-1	-1	-2	0.0	-0.1	0.0	-0.1	0.0	-2.0	-0.4	-2.4
Transportation, Warehousing & Utilities	0	-3	-1	-4	0.0	-0.2	-0.1	-0.3	0.0	-0.9	-0.3	-1.2
Wholesale Trade	0	-2	-1	-3	0.0	-0.1	-0.1	-0.2	0.0	-0.4	-0.2	-0.6
Retail Trade	0	0	-9	-9	0.0	0.0	-0.4	-0.4	0.0	0.0	-0.7	-0.8
Information	0	0	0	-1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2
Financial Activities	0	-13	-4	-16	0.0	-0.3	-0.1	-0.4	0.0	-2.8	-1.8	-4.6
Services	0	-6	-25	-31	0.0	-0.3	-1.1	-1.4	0.0	-0.6	-2.1	-2.7
Government	0	-1	0	-1	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.3
Total	**-145**	**-90**	**-42**	**-277**	**-6.5**	**-3.6**	**-1.9**	**-12.0**	**-22.9**	**-10.2**	**-5.9**	**-39.0**

Note:

* In 2012 dollars.

Table 19B.40 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Sacramento Valley under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.8	0.7	0.0	-0.1	1.7	1.6
Mining & Logging	0	0	0	0	0.0	-0.1	0.1	-0.1	0.0	-0.4	0.3	-0.1
Construction	0	0	0	0	0.0	-16.1	1.5	-14.7	0.0	-29.9	2.6	-27.3
Manufacturing	0	0	0	0	0.0	-0.4	2.4	2.0	0.0	-3.2	22.7	19.5
Transportation, Warehousing & Utilities	-1	0	0	-1	-70.3	-0.8	5.6	-65.4	-295.2	-2.9	18.4	-279.6
Wholesale Trade	0	0	0	0	0.0	-0.4	9.7	9.3	0.0	-1.0	27.8	26.8
Retail Trade	0	0	1	1	0.0	-0.5	23.9	23.4	0.0	-0.9	47.7	46.8
Information	0	0	0	0	0.0	-0.5	3.5	3.0	0.0	-3.5	21.1	17.6
Financial Activities	0	0	0	0	0.0	-2.3	17.3	15.0	0.0	-13.4	151.3	137.9
Services	0	0	2	1	0.0	-17.3	88.9	71.5	0.0	-31.8	158.5	126.8
Government	0	0	0	0	0.0	-0.1	2.0	1.9	0.0	-0.2	3.9	3.8
Total	**-1**	**-1**	**3**	**1**	**-70.3**	**-38.6**	**155.6**	**46.7**	**-295.2**	**-87.3**	**456.1**	**73.6**

Note:
* In 2012 dollars.

Table 19B.41 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Joaquin Valley under Alternative 5 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	2.4	2.5	0.0	0.1	7.4	7.5
Mining & Logging	0	0	0	0	0.0	0.3	2.3	2.5	0.0	0.8	7.1	7.8
Construction	0	0	0	0	0.0	14.4	3.4	17.8	0.0	27.2	6.1	33.4
Manufacturing	0	0	0	0	0.0	0.2	4.2	4.4	0.0	2.8	51.3	54.1
Transportation, Warehousing & Utilities	1	0	0	1	81.4	0.7	13.0	95.1	287.4	2.8	49.4	339.5
Wholesale Trade	0	0	0	0	0.0	0.2	14.6	14.8	0.0	0.7	42.9	43.6
Retail Trade	0	0	1	1	0.0	0.4	53.6	54.0	0.0	0.8	107.9	108.7
Information	0	0	0	0	0.0	0.3	5.4	5.7	0.0	2.0	29.8	31.8
Financial Activities	0	0	1	1	0.0	1.3	19.7	20.9	0.0	8.9	291.4	300.3
Services	0	0	4	4	0.0	12.5	171.8	184.3	0.0	23.9	323.4	347.2
Government	0	0	0	0	0.0	0.1	6.9	7.0	0.0	0.2	14.2	14.5
Total	**1**	**1**	**6**	**8**	**81.4**	**30.5**	**297.2**	**409.2**	**287.4**	**70.1**	**930.8**	**1,288.4**

Note:

* In 2012 dollars.

Table 19B.42 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the San Francisco under Alternative 5 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	4.3	4.3	0.0	-0.1	8.4	8.3
Mining & Logging	0	0	0	0	0.0	-0.8	1.9	1.1	0.0	-1.7	5.3	3.5
Construction	0	-1	0	-1	0.0	-106.6	24.3	-82.3	0.0	-176.1	39.5	-136.6
Manufacturing	0	0	1	0	0.0	-3.4	55.2	51.8	0.0	-32.0	509.0	477.0
Transportation, Warehousing & Utilities	-6	0	1	-5	-656.9	-3.7	69.2	-591.5	-1,654.5	-12.4	195.3	-1,471.6
Wholesale Trade	0	0	2	1	0.0	-2.5	168.2	165.7	0.0	-5.5	373.6	368.1
Retail Trade	0	0	7	7	0.0	-2.5	326.2	323.7	0.0	-4.7	603.7	599.0
Information	0	0	1	1	0.0	-4.9	97.6	92.7	0.0	-18.6	326.5	307.9
Financial Activities	0	0	5	5	0.0	-13.2	232.9	219.7	0.0	-61.9	1,853.1	1,791.2
Services	0	-1	22	20	0.0	-93.5	1,406.9	1,313.4	0.0	-148.2	2,302.6	2,154.4
Government	0	0	0	0	0.0	-0.4	32.4	32.0	0.0	-0.7	58.7	57.9
Total	**-6**	**-3**	**37**	**29**	**-656.9**	**-231.6**	**2,419.1**	**1,530.6**	**-1,654.5**	**-462.0**	**6,275.6**	**4,159.1**

Note:

* In 2012 dollars.

Table 19B.43 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Central Coast Region under Alternative 5 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.2	2.4	2.2	0.0	-0.6	4.3	3.7
Mining & Logging	0	0	0	0	0.0	-1.9	2.3	0.3	0.0	-6.8	9.9	3.1
Construction	0	-2	0	-2	0.0	-113.0	5.8	-107.2	0.0	-214.8	10.4	-204.4
Manufacturing	0	0	0	0	0.0	-1.7	2.8	1.1	0.0	-28.6	55.4	26.8
Transportation, Warehousing & Utilities	-7	0	0	-7	-394.8	-4.0	14.3	-384.5	-1,606.9	-18.1	60.1	-1,565.0
Wholesale Trade	0	0	0	0	0.0	-1.8	21.6	19.8	0.0	-5.1	62.7	57.5
Retail Trade	0	0	1	1	0.0	-3.4	65.2	61.8	0.0	-6.5	126.7	120.2
Information	0	0	0	0	0.0	-2.5	9.6	7.2	0.0	-12.8	41.7	29.0
Financial Activities	0	0	1	1	0.0	-12.6	31.8	19.3	0.0	-73.3	376.2	303.0
Services	0	-2	5	3	0.0	-94.5	260.1	165.5	0.0	-177.8	478.2	300.4
Government	0	0	0	0	0.0	-0.5	7.1	6.6	0.0	-1.0	14.1	13.1
Total	**-7**	**-4**	**9**	**-2**	**-394.8**	**-236.2**	**423.1**	**-207.9**	**-1,606.9**	**-545.3**	**1,239.6**	**-912.6**

Note:

* In 2012 dollars.

Table 19B.44 Changes in Municipal and Industrial Water Supply-related Regional Economic Impacts for the Southern California Region under Alternative 5 Compared to the Second Basis of Comparison

Economic Sectors	Employment				Labor Income ($ thousands)*				Economic Output ($ thousands)*			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	2	1	0.0	-3.6	128.5	124.9	0.0	-10.0	276.1	266.1
Mining & Logging	0	0	1	1	0.0	-39.2	99.6	60.3	0.0	-131.1	372.3	241.2
Construction	0	-35	3	-32	0.0	-2,258.1	224.9	-2,033.2	0.0	-4,156.1	400.7	-3,755.4
Manufacturing	0	-2	10	9	0.0	-144.4	813.8	669.4	0.0	-1,159.8	6,894.7	5,734.9
Transportation, Warehousing & Utilities	-140	-2	12	-130	-10,274.1	-131.4	833.0	-9,572.5	-34,869.2	-472.7	2,639.9	-32,702.0
Wholesale Trade	0	-1	20	19	0.0	-82.0	1,618.8	1,536.8	0.0	-219.8	4,338.8	4,119.1
Retail Trade	0	-2	59	58	0.0	-71.5	2,638.7	2,567.2	0.0	-136.2	5,205.5	5,069.3
Information	0	-1	7	6	0.0	-112.0	761.6	649.7	0.0	-509.0	2,994.4	2,485.4
Financial Activities	0	-7	52	45	0.0	-457.7	2,896.9	2,439.2	0.0	-2,019.0	18,055.5	16,036.5
Services	0	-37	215	178	0.0	-2,610.1	11,630.4	9,020.3	0.0	-4,424.9	20,732.4	16,307.5
Government	0	0	3	3	0.0	-13.7	310.6	296.9	0.0	-23.8	594.9	571.1
Total	**-140**	**-86**	**384**	**158**	**-10,274.1**	**-5,923.8**	**21,956.8**	**5,758.9**	**-34,869.2**	**-13,262.4**	**62,505.2**	**14,373.6**

Note:
* In 2012 dollars.

Appendix 23A

Scoping Report

This appendix includes the Scoping Report as it was published in February 2013.

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RECLAMATION

Managing Water in the West

Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

Environmental Impact Statement Scoping Report

Mid-Pacific Region
Bay-Delta Office

U.S. Department of the Interior
Bureau of Reclamation

February 2013

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Table 4.2 Summary of Scoping Comments..... 4-13

Abbreviations and Acronyms

BDCP	Bay Delta Conservation Plan
BA	Biological Assessment
BIA	Bureau of Indian Affairs
CFR	Code of Federal Regulations
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
District Court	US District Court for the Eastern District of California
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NMFS BO	National Marine Fisheries Service Biological Opinion
NOI	Notice of Intent
Reclamation	Bureau of Reclamation
RPA	Reasonable and Prudent Alternative
SWP	State Water Project
SWRCB	State Water Resources Control Board
USACE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish & Wildlife Service
USFWS BO	US Fish & Wildlife Service Biological Opinion

Chapter 1

Introduction

An Environmental Impact Statement (EIS) is being prepared by the Department of the Interior Bureau of Reclamation (Reclamation) for the Remanded Biological Opinions on the Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP). Reclamation intends to prepare an EIS for modifications to the continued long-term operation of the CVP, in a coordinated manner with the SWP, that are likely to avoid jeopardy and destruction or adverse modification of designated critical habitat in accordance with the federal Endangered Species Act (ESA). The EIS will be prepared in accordance with the National Environmental Policy Act (NEPA). Reclamation initiated the public scoping process to obtain suggestions and information on the alternatives and topics to be addressed, and any other important issues related to the proposed action.

This Scoping Report documents the public scoping process and comments received by Reclamation on the scope of the EIS.

Scoping Purpose and Process

Scoping provides an opportunity to involve other agencies, interested persons, and the public early in the decision-making process to identify concerns and alternatives, collect information to be considered during preparation of the EIS, and identify the need to focus on specific issues during the impacts and benefits analysis.

Scoping is conducted in accordance with NEPA regulations (40 Code of Federal Regulations (CFR) 1501.7) defined as "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." The information will be used to identify significant issues, including issues related to the approach to resource issues, study constraints, potentially affected geographical areas, and extent of impact assessments; study participants and methods for participation in the study; alternatives to be considered; potential cumulative impacts; and related activities. The lead Federal agency is required by 40 CFR 1501.7(a) to:

- Invite participation of affected Federal, State, and local agencies; affected Indian tribes; and other interested persons.
- Determine the scope and the significant issues to be analyzed in depth in the environmental impact statement.
- Identify study issues which are not significant or which have been covered by prior environmental review, and narrow the discussion of these issues to a brief presentation of why these issues will not have a significant effect on the human environment or providing a reference to their coverage elsewhere.

- Allocate assignments for preparation of the EIS among lead and cooperating agencies, with the lead agency retaining responsibility for the EIS.
- Indicate any public environmental assessments and other environmental impact statements which are being or will be prepared that are related to but are not part of the scope of the impact statement under consideration.
- Identify other environmental review and consultation requirements so the lead and cooperating agencies may prepare other required analyses and studies concurrently with, and integrated with, the EIS.
- Indicate the relationship between the timing of the preparation of environmental analyses and the agency's tentative planning and decision-making schedule.

Scoping comments can be used to focus the NEPA analysis on the potentially significant issues (40 CFR 1500.4(g)).

Scoping is to be initiated as soon as possible after the lead agency(s) decides to prepare an EIS (40 CFR 1508.22) through the publication of a Notice of Intent (NOI) to prepare an EIS. The NOI is published in the Federal Register prior to initiating the public scoping process. Public scoping meetings are generally held following publication of the NOI. Comments continue to be collected for several weeks following the scoping meetings. A scoping report is often published to summarize the issues identified in the formal scoping process and publicize decisions related to preparation of the EIS. Scoping frequently continues throughout the preparation of the Draft EIS.

Overview of Scoping Process

Reclamation initiated the public scoping process by issuing the NOI to prepare an EIS on March 28, 2012. A copy of the NOI is included in Attachment A. In accordance with the NOI, Reclamation initially held four public scoping meetings throughout the State. In response to numerous requests from other agencies and interested persons, Reclamation held a fifth scoping meeting. The scoping process is described in more detail in Chapter 3, Scoping Process, of this Scoping Report.

Cooperating Agencies

A cooperating agency is defined as any Federal agency, except the NEPA lead agency, that has jurisdiction by law or has special expertise with respect to any environmental issue that should be addressed in the EIS. A cooperating agency also can include a governmental entity (state, tribal, or local) that has jurisdiction by law or special expertise with respect to any environmental impact associated with the action being considered.

For this EIS, the Federal cooperating agencies include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers

(USACE), and Bureau of Indian Affairs (BIA). Reclamation has also provided non-Federal agencies with the opportunity to participate in the NEPA process as a cooperating agency.

In August of 2012, Reclamation mailed invitations to the following 747 non-Federal entities to be cooperating agencies for this EIS:

- California Department of Water Resources
- California Department of Fish and Game
- State Water Resources Control Board (SWRCB)
- Agencies that have contracts with the CVP or SWP for water delivery, water service repayment, exchange or settlement, or use of CVP or SWP facilities for conveyance
- State and Federal Contractors Water Agency
- Cities and counties within the CVP and SWP service areas
- Federally-recognized tribes within the CVP and SWP service area or areas affected by CVP or SWP operations

Non-Federal entities that meet the specified criteria for cooperating agencies are required to enter into a Memorandum of Understanding with Reclamation to memorialize their participation as a cooperating agency.

As of November 2012, Reclamation has received 15 responses in the affirmative and has distributed Memorandum of Understanding to the following entities:

- Contra Costa Water District
- Reclamation District 108
- San Juan Water District
- Stockton East Water District
- Tehama Colusa Canal Authority
- San Diego County Water Authority
- California Valley Miwok Tribe
- Oakdale Irrigation District
- Del Puerto Water District
- Friant Water Authority
- San Luis & Delta-Mendota Water Authority
- Sutter Mutual Water District
- City of Hesperia
- Zone 7 Water Agency
- Humboldt County Board of Supervisors

Reclamation also received a request from an interested party to include the Federal Emergency Management Agency (FEMA) as a cooperating agency. However, Reclamation concluded that FEMA does not have special expertise related to environmental issue that would not be addressed by other Federal agencies, including USFWS, NMFS, USEPA, BIA, or USACE.

Organization of Scoping Report

This Scoping Report summarizes: (1) the purpose for the action to be evaluated in the EIS (Chapter 2), (2) the public scoping process (Chapter 3), (3) the scoping comments (Chapter 4), copies of the NOI and notice of extension of the public scoping period (Attachment A), the Reclamation News Releases and a typical newspaper notification (Attachment B), scoping meeting materials (Attachment C), scoping meeting transcripts (Attachment D), and written scoping comments (Attachment E).

Chapter 2

Overview of Potential Action

As described in the NOI published March 28, 2012, an EIS is to be prepared for modifications to the continued long-term operation of the CVP, in a coordinated manner with the SWP, that are likely to avoid jeopardy and destruction or adverse modification of designated critical habitat. This chapter provides an overview of this action and background information related to the decision by Reclamation to prepare an EIS.

Purpose of Initiating the Action

The CVP is operated in coordination with the SWP under the Coordinated Operation Agreement between the Federal government and the State of California (authorized by Public Law 99–546). Operation of the CVP and SWP are described in Reclamation's 2008 Biological Assessment (BA), as modified by general changes due to the passage of time and those items that have changed due to legislation or litigation since the completion of the BA.

In December 2008, USFWS issued a Biological Opinion (USFWS BO) analyzing the effects of the coordinated long-term operation of the CVP and SWP in California. The USFWS BO:

- Concluded that ''the coordinated operation of the CVP and SWP, as proposed, [was] likely to jeopardize the continued existence of the delta smelt'' and ''adversely modify delta smelt critical habitat.''
- Included a Reasonable and Prudent Alternative (RPA) for CVP and SWP operations designed to allow the projects to continue operating without causing jeopardy or adverse modification.

On December 15, 2008, Reclamation provisionally accepted, and began implementing, the USFWS RPA.

In June 2009, the NMFS issued a Biological Opinion (NMFS BO) analyzing the effects of the coordinated long-term operation of the CVP and SWP on listed salmonids, green sturgeon and southern resident killer whale. The NMFS BO:

- Concluded that the long-term operation of the CVP and SWP, as proposed, was likely to:
  - Jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, southern distinct population segment of North American green sturgeon, and southern resident killer whales.
  - Destroy or adversely modify critical habitat for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central

Valley steelhead and the Southern distinct population segment of North American green sturgeon.

- Included a RPA designed to allow the projects to continue operating without causing jeopardy or adverse modification.
- On June 4, 2009, Reclamation provisionally accepted and began implementing the NMFS RPA.

Several lawsuits were filed in the United States District Court for the Eastern District of California (District Court) challenging various aspects of the USFWS and NMFS BOs and Reclamation's acceptance and implementation of the associated RPAs. Many of the lawsuits were consolidated into two proceedings focused on each BO. The outcomes of the consolidated cases are summarized below.

- On November 16, 2009, the District Court ruled that Reclamation violated NEPA by failing to conduct a NEPA review of the potential impacts to the human environment before provisionally accepting and implementing the 2008 USFWS BO and RPA. Reclamation was ordered to review the USFWS BO and RPA in accordance with NEPA.
- On March 5, 2010, the District Court held that Reclamation violated NEPA by failing to undertake a NEPA analysis of potential impacts to the human environment before accepting and implementing the RPA in the 2009 NMFS BO. Reclamation was ordered to review the USFWS BO and RPA in accordance with NEPA.
- The District Court found certain portions of the USFWS BO to be arbitrary and capricious, and remanded those portions of the Biological Opinion to USFWS. The District Court remanded the USFWS BO to USFWS without vacatur for further consideration.
- The District Court found certain portions of the NMFS BO to be arbitrary and capricious. The District Court remanded the NMFS BO to NMFS without vacatur for further consideration.

To comply with the District's Court orders regarding NEPA, Reclamation initiated a combined NEPA process addressing both the USFWS and NMFS RPAs. The combined NEPA process will analyze the effects of modifications to the coordinated long-term operation of the CVP and SWP that are likely to avoid jeopardy to listed species and destruction or adverse modification of designated critical habitat.

Purpose and Need for Action

The purpose of the action is to continue the operation of the CVP, in coordination with operation of the SWP, to meet the authorized purposes of the CVP and SWP, in a manner similar to that described in the 2008 BA with appropriate modifications, in a manner that:

- Is consistent with Federal Reclamation law, applicable statutes, previous agreements and permits, and contractual obligations;
- Avoids jeopardizing the continued existence of federally listed species; and
- Does not result in destruction or adverse modification of designated critical habitat.

Continued operation of the CVP is needed to provide flood control, water supply, fish and wildlife restoration and enhancement, and power generation. It also provides navigation, recreation, and water quality benefits. However, coordinated operation of the CVP and SWP, as described in the 2008 BA, was found to likely jeopardize the continued existence of listed species and adversely modify critical habitat. The ESA requires Federal agencies to insure that their actions are not likely to jeopardize listed species or result in the destruction or adverse modification of critical habitat. Modifications to the coordinated operation of the CVP and SWP to be evaluated should be consistent with the intended purpose of the action, within the scope of Reclamation's legal authority and jurisdiction, economically and technologically feasible, and avoid the likelihood of jeopardizing listed species or resulting in the destruction or adverse modification of critical habitat.

Chapter 3

Scoping Process

As part of the public scoping process, Reclamation published the NOI, conducted five scoping meetings, and reviewed scoping comments presented at the scoping meetings and submitted during the public scoping period.

Public Outreach Efforts during Scoping Process

The scoping process was initiated on March 28, 2012, with the publication of the NOI in the Federal Register and continued through June 28, 2012.

Notice of Intent and Notice of Extension

As described in Chapter 2 of this Scoping Report, the NOI provided a summary of the purpose of initiating review of the action and purpose of the action, description of the Project Area, initial list of alternatives to be considered, statutory authority to prepare an EIS), and the process to provide scoping comments. Reclamation published the NOI on March 28, 2012. Initially the public scoping process was to be completed on May 29, 2012. During the public scoping process, other agencies and interested persons requested an extension of the public scoping process to provide additional opportunities to provide scoping comments. In response to these requests, Reclamation published a notice of extension of the public scoping on May 25, 2012 to extend the public scoping period through June 28, 2012. Copies of the NOI and the notice of extension are included in Attachment A.

Scoping Meeting Notifications

Reclamation issued a press release on March 28, 2012, to announce the initiation of the public scoping process, the basic need for preparing an EIS, dates and locations of the scoping meetings, and information as to Reclamation's contact person and how to submit comments. Reclamation also issued a press release on May 25, 2012, to announce that the public scoping period extension. Reclamation also distributed the press release to Reclamation's media list and e-mail notification list.

Reclamation placed display advertisements in newspapers that served areas where the first four scoping meetings were held, as summarized in Table 3.1. The advertisements announced the basic need for preparing an EIS, dates and locations of the scoping meetings, and information as to Reclamation's contact person and how to submit comments.

The press release and a typical display advertisement are included in Attachment B.

Table 3.1 Newspaper Display Advertisements to Announce Scoping Meetings

Newspaper	Date of Display Advertisement	General Newspaper Distribution Area (General Weekday Circulation)
Sacramento Bee	April 11, 2012	Sacramento Valley (200,000)
Chico Enterprise Record	April 11, 2012	Butte, Glenn, and Tehama Counties (31,500)
Appeal-Democrat	April 11, 2012	Sutter and Yuba Counties (20,000)
Fresno Bee	April 11, 2012	San Joaquin Valley (380,700)
Madera Tribune	April 11, 2012	Madera and Fresno Counties (4,600)
Contra Costa Times Oakland Tribune San Jose Mercury News	April 11, 2012	San Francisco Bay Area (530,000 in total)
Los Angeles Times	April 11, 2012	Southern California and Central Coast (631,700)

Reclamation Website

Reclamation maintains a project website for the Remand Process for the Coordinated Long-term Operation of the CVP and SWP linked to the Bay-Delta Office website (http://www.usbr.gov/mp/BayDeltaOffice/Documents/remand.html). The website includes information prepared for the scoping meetings and the scoping comments, information to be considered by Reclamation in preparation of the BA, and reference materials related to the BOs.

Scoping Meetings

Five scoping meetings were held to inform the public and interested stakeholders about the project, and to solicit comments and input on the EIS. Initially, four scoping meetings were held in:

- Madera, California on April 25, 2012 (6 participants)
- Diamond Bar, California on April 26, 2012 (3 participants)
- Sacramento, California on May 2, 2012 (15 participants)
- Marysville, California on May 3, 2012 (2 participants).

Following the initial scoping meetings, Reclamation received several requests to hold an additional scoping meeting in the western San Joaquin Valley and to extend the public scoping comment period. As described above, Reclamation issued a notice of extension of the public scoping comment period and conducted a fifth scoping meeting as follows:

- Los Banos, California on May 22, 2012 (230 participants).

Each participant in the scoping meetings was invited to sign an attendance sheet and provided with an agenda, fact sheet, comment card, and speaker card. The agenda, fact sheet, and comment card were available in both English and Spanish. The scoping meeting agenda, fact sheet, comment card, and speaker card are provided in Attachment C.

Each scoping meeting began with a presentation by Reclamation. The presentation, included in Attachment C, described the purpose of the meeting and the public scoping process, an overview of the reasons that Reclamation was preparing the EIS, description of the process and schedule that Reclamation will use to complete the EIS, and methods to provide comments at the scoping meeting and subsequently until the end of the public scoping period. The participants were encouraged to submit written comments by mail, email, or fax until the close of the public scoping comment period. During the presentation, Reclamation responded to questions as they arose from the meeting participants. Following the presentation, Reclamation heard testimony from those who presented oral comments. Oral comments were recorded by a transcriber and are included in Attachment D. Reclamation offered to provide Spanish translation of the presentation and oral comments at each scoping meeting; however, the translation service was only requested and provided at the scoping meeting in Los Banos.

Chapter 4

Summary of Scoping Comments

This chapter summarizes the range of scoping comments received during the public scoping period that extended from March 28, 2012 through June 28, 2012. The public was provided opportunities to comment in writing and orally at public scoping meetings, and to provide written comments to Reclamation via mail, email, or fax.

Scoping Commenters

Reclamation received verbal comments from scoping meeting participants and written comments in comment cards, letters, and emails from agencies, interested parties, and individuals, as summarized in Table 4.1 (presented at the end of this chapter). The commenters are arranged in this table with the oral comments from the scoping meetings presented in chronological order of the scoping meetings. For each scoping meeting and for all written comments, the comments are categorized by the type of affiliation of the commenter. The comments are arranged in the following order: Federal agencies, state agencies, local agencies, interested parties, and individuals. Within each grouping, the agencies and interested parties are arranged alphabetically by their affiliation and the individuals are arranged alphabetically by their last name.

Summary of Scoping Comments

The following summary of the scoping comments are organized by topic area and arranged in the order that the topics are addressed in a typical EIS. This organization does not represent a relative importance among comments or topic areas, but rather is intended to facilitate presentation of comments in an orderly manner.

A summary of comments received from each commenter is presented at the end of this chapter in Table 4.2. Table 4.2 does not include the complete text of each comment, but presents a brief excerpt from the comments. The comments are arranged in the following order: Federal agencies, state agencies, local agencies, interested parties, and individuals. Within each grouping, the agencies and interested parties are arranged alphabetically by their affiliation and the individuals are arranged alphabetically by their last name.

Transcripts from the scoping meetings and written scoping comments are included in Attachments D and E, respectively.

Purpose and Need

Several comments were provided which addressed the purpose and need for the action. Specifically, comments suggested:

- The purpose and need should be to avoid jeopardy of listed species and destruction or adverse modification of critical habitat while supplying sufficient water to meet the agricultural, municipal, and industrial needs of millions of Californians in the CVP and SWP service areas.
- The purpose of the action should not include compliance with ESA. The need for the action should consider providing water supply as fully as possible while complying with ESA.
- The purpose of the action should not include measures to meet water contract quantity amounts.

Study Area

Comments which addressed the study area to be considered in the EIS suggested that the EIS study area should include the Delta, Sacramento and San Joaquin river watersheds, and other areas that use water provided by the CVP and SWP. Other comments suggested that portions of the CVP facilities and operations not be included in the study area, including the New Melones Unit and diversions by Contra Costa Water District, except for diversions at Rock Slough.

No Action Alternative

Several comments were provided which addressed the definition of the No Action Alternative. Specifically, comments suggested:

- The No Action Alternative should include implementation of the RPAs in the 2008 USFWS and 2009 NMFS BOs.
- The No Action Alternative should not include implementation of the RPAs in the 2008 USFWS and 2009 NMFS BOs.
- The No Action Alternative should include new project operations, including San Joaquin River Restoration Program.
- The No Action Alternative should define actions related to operations of the CVP and SWP that are not discretionary, including providing water supplies to water rights contractors and exchange contractors, and “Level 2” water supplies to refuges; water operations in accordance with requirements of the SWRCB orders and decision; water supplies for water rights holders; and flood management operations.
- The No Action Alternative should include implementation of the Bay Delta Conservation Plan (BDCP) and the 2006 SWRCB Water Quality Control Plan for the San Francisco Bay and Sacramento-San Joaquin Delta Estuary.
- The No Action Alternative should include environmental conditions related to other actions, including discharge of constituents into waterways by point and non-point dischargers.
- The “environmental baseline for the EIS” should reflect conditions at the time of the initial consultations with USFWS and NMFS in the 1990s.

Definition of Alternatives

Several comments were provided which addressed the range of alternatives. Specifically, comments suggested:

- Alternatives should be developed using new scientific information which may result in less focus on food web support or the location of brackish water/salt water interface in the Delta (also known as "X2 location").
- Some alternatives should include additional opportunities to transfer water through the Delta.
- Some alternatives should include measures to benefit the survival and recovery of listed species that do not involve modifications of CVP and SWP operations, such as improved water quality, reduction of predation of aquatic resources, or regulation of small unscreened water diversions.
- Some alternative could consider complete cessation of CVP and SWP operations to indicate the benefits of these water projects.
- Some alternatives should include measures to meet Federal and state fish population doubling mandates and goals.
- Some alternatives should include measures to reduce reliance on Delta water supplies, energy use, and greenhouse gas emissions.
- Some alternatives should not include operations plans for the Stanislaus River that have been developed by local water rights holders.
- Some alternatives should include measures that assume all CVP water supplies available within the American, Sacramento, and Trinity watersheds will be used within those watersheds or within the combined boundaries of these watersheds prior to use of the water in other portions of the CVP service area.
- Some alternatives should include measures that assume that Central Valley Project Improvement Act (CVPIA) restoration funds collected from CVP water users within the American River Division be used for restoration of the lower American River.
- Some alternatives should either not include Contra Costa Water District intakes within the calculations for CVP and SWP south Delta intake operational criteria referred to as "Old and Middle River Flow Criteria" to reduce reverse flows in the south Delta, or replace the criteria with an index developed by Contra Costa Water District.
- One of the alternatives should include the following measures:
  - Different criteria for Old and Middle River Flow Criteria than included in the 2008 USFWS and 2009 NMFS BOs.
  - Different criteria for operations of south Delta intakes based upon San Joaquin River inflow and south Delta exports than included in the 2009 NMFS BOs.

  - Predation control program focused on population reduction of black bass, striped bass, and pike minnows.
  - Floodplain habitat restoration for salmon and delta smelt habitat.
  - Trap and haul program upstream of the Head of Old River Barrier for juvenile salmonids entering the Delta from the San Joaquin River.
  - Minimize harvest mortality of natural origin Central Valley Chinook salmon.
- One of the alternatives should include the following measures:
  - Floodplain development limits and habitat restoration for salmon and delta smelt.
  - Levee vegetation and armoring policy for salmon and delta smelt.
  - Predation control program focused on population reduction of black bass, striped bass, and pike minnows.
  - Water quality improvement program at the Sacramento Regional County Sanitation District and the Fairfield-Suisun Sewer District treatment plant.
  - Trap and haul program upstream of the Head of Old River Barrier for juvenile salmonids entering the Delta from the San Joaquin River.
  - Harvest restrictions for salmon.
- One of the alternatives should include the following measures:
  - Different criteria for operations of south Delta intakes based upon San Joaquin River inflow and south Delta exports than included in the 2009 NMFS BOs to increase San Joaquin River inflow.
  - Measures to calculate the winter run Chinook salmon juvenile production estimate to reflect the best available science, including corrections for overestimation of in-river survival to the Delta in light of results of acoustic tagging studies.
  - Measures to reflect improved “first flush” triggers to reflect when delta smelt begin upstream migration to spawn.
  - More restrictive seasonal Old and Middle River flow requirements to further reduce entrainment of early spawning larval and juvenile delta smelt.
  - Measures to reduce impacts of CVP and SWP operations on primary productivity and food supply for delta smelt and salmonids, including effects of reduced spring outflow, exports, barrier operations, and changes in residence time.
  - Measures to protect longfin smelt, particularly increased spring Delta outflow.

Affected Environment and Impact Analysis: Water Resources

Several comments were provided which addressed surface water and groundwater resources. Specifically, comments suggested:

- Water resources impact analyses should evaluate frequency and extent of CVP and SWP operations that reduce water storage in CVP and SWP reservoirs.
- Water resources impact analyses should evaluate the impacts of water temperatures and other water quality parameters of operations of the frequency and extent of CVP and SWP operations that reduce water storage in CVP and SWP reservoirs.
- Water resources impact analyses should evaluate conditions under a wider range of drier and wetter periods of hydrology than has been evaluated in recent analyses, including projects that have relied upon Delta Simulation Model 2 results.
- Water resources impact analyses should consider the effects of increased salinity in Delta water supplies related to the ability of water users in southern California to dilute salinity in Colorado River water supplies.
- Water resources impact analyses should consider the effects of increased salinity in Delta water supplies related to the need for additional water treatment processes by municipal and industrial water users, effects on groundwater aquifers that use Delta water supplies for partial recharge, and effects on uses of recycled water from communities that use Delta water supplies.
- Water resources impact analyses should consider the effects of increased frequency of maintaining cold water storage in upstream reservoirs on irrigated agriculture and municipal and industrial water treatment plants that use CVP and SWP water supplies.
- Groundwater resources analyses should evaluate the impacts of increased groundwater pumping that cause increased rates of subsidence and the related impacts to infrastructure and agricultural production.

Affected Environment and Impact Analysis: Land Use and Economic Issues

Several comments were provided which addressed land use and economic issues. Specifically, comments suggested:

- Land use and economic impact analyses should evaluate the impacts on land use and socioeconomics related to the frequency and extent of CVP and SWP operations that reduce water availability to water users.
  - Potential impacts to be evaluated could range from the effects on agricultural water users that may shift crops or change land fallowing patterns, effects on crop yield, and the cost of purchasing supplemental water supplies.

  - Potential impacts to be evaluated could range from effects on municipal and industrial water users that may reduce the ability for communities to grow in accordance with their general plans and influence industrial users to invest in these communities.

- Land use and economic impact analyses should evaluate the impacts on land use and socioeconomics related to the frequency and extent of CVP and SWP operations that reduce water storage in CVP and SWP reservoirs and specifically constrain water deliveries to water users in the Trinity, American, and Sacramento rivers' watersheds.
- Economic impact analysis should evaluate impacts to the regions and communities as well as primary and secondary impacts to the water users, including the cost on businesses and industries that are directly and indirectly linked to agricultural or industrial production or community development, public services that may have changes in demand for services with less funding support, and costs for social services.
- Economic impact analyses should evaluate the recreational values for communities located near reservoirs that may experience frequent and/or extensive periods when declines in water elevations could result in less recreational opportunities.

Affected Environment and Impact Analysis: Biological Resources Issues

Several comments were provided which addressed biological resources issues. Specifically, comments suggested:

- Biological resources impact analyses should evaluate the impacts not only within the Sacramento and San Joaquin rivers' watersheds, but also changes in habitat in areas that use Delta water. These habitat areas could include:
  - Wetland and riparian areas, including areas within wildlife refuges that use Delta water, groundwater recharge ponds, and areas that may experience less stream flows if water is diverted to be used as supplemental water for areas that receive less Delta water.
  - Fallowed fields reduces agricultural habitat and increases the potential for invasive species.
- Biological resources impact analyses should include:
  - Citations to the data supporting statements as to the status of the species.
  - Information on the species with specific discussions of the basis of the information supported directly by data, based on hypothesis, and "best professional judgment."
  - Information related to the effects of water quality, including ammonia deposition, on food web support, especially related to delta smelt populations.

  - Information related to operation of the south Delta intakes and the long-term abundance of delta smelt.
  - Information related to the assumption that changes in the hydrology have resulted in "year-round flows," and that if these changes have occurred, these flows have resulted in "year-round salmon runs" through hybridizing of distinct salmon runs.
  - Information related to the occurrence of delta smelt populations, especially in locations recently identified.
  - Information related to delta smelt spawning in the wild.
  - Information related to the effect of spring inflows on delta smelt populations.
  - Information related delta smelt life-cycle models.
  - Information related to the effectiveness of ongoing conservation actions implemented under existing biological opinions in accordance with the USFWS Policy for Evaluating Conservation Effectiveness.
- Biological resources impact analyses should analyze other fish species in addition to the Federally-listed threatened and endangered species, including longfin smelt and the species addressed in the BDCP.
- Biological resources impact analyses should analyze the effects of changes in Sacramento River operations on salmonids in the Sacramento River, and include analytical methods developed by Northern California Water Association to evaluate impacts on the anadromous fishery in the Sacramento River.
- Biological resources impact analyses should analyze the effects of changes in American River operations on fish in the American River and the ability to achieve lower American River flow standards proposed through the regional Water Forum Agreement.
- Biological resources impact analyses should analyze the effects of Delta Cross Channel gate operations on the migration of Mokelumne- and Cosumnes-origin Central Valley Steelhead and fall-run Chinook salmon, including with consideration of cumulative impacts of implementation of the San Joaquin River Restoration Program.
- Biological resources impact analyses should consider alternative analytical tools to evaluate effects on salmonids in the Stanislaus and lower San Joaquin rivers and the south Delta as compared to analytical tools developed by California Department of Fish and Game.

Affected Environment and Impact Analysis: Air Quality Issues

Several comments were provided which addressed air quality issues. Specifically, comments suggested:

- Air quality impact analyses should evaluate the potential changes in dust generation and compliance with adopted State Air Quality Implementation Plans related to changes in the frequency and extent of fallowed fields due to changes in availability of CVP and SWP water supplies.

Affected Environment and Impact Analysis: Recreation and Visual Resources Issues

Several comments were provided which addressed recreation and visual resources issues. Specifically, comments suggested:

- Recreation and visual resources impact analyses should evaluate the effects of changes in the frequency and extent of low reservoir storage elevations at CVP and SWP reservoirs
- Visual resources and aesthetics impact analyses should evaluate the effects of fallowed agricultural lands due to changes in availability of CVP and SWP water supplies.
- Visual resources and aesthetics impact analyses should evaluate the effects of communities that may experience urban decay due to loss of agricultural employment related to changes in availability of CVP and SWP water supplies.

Several scoping comments discussed the preparation and presentation of information used in the development of the EIS and Reclamation's decisions. Comments were provided related to the need to provide: peer-reviewed information; descriptions of the degree of scientific uncertainty of the information and potential effects on impact analyses results; and a description of basis of all analyses including results supported directly by data, based on hypothesis, or "best professional judgment."

Table 4.1 Commenters During the Scoping Process

Type of Comment	Affiliation	Name	Date of Comment
Oral Comments at the Madera Scoping Meeting	Farmer in Westlands Water District	Todd Neves	4/25/12
	Friant Water Authority	Steve Ottemoeller	4/25/12
	Superior Almond Hauling	Brad Craven	4/25/12
	Westlands Water District	Tom Glover	4/25/12
	Westlands Water District	Gayle Holman	4/25/12
Oral Comments at the Diamond Bar Scoping Meeting	Metropolitan Water District of Southern California	Delaine Shane	4/26/12
	State Water Contractors	Melissa Cushman	4/26/12
Oral Comments at the Sacramento Scoping Meeting	California Department of Water Resources	Mike Ford	5/2/12
	San Luis Delta Mendota Water Authority and Westlands Water District	Rebecca Akroyd	5/2/12
Oral Comments at the Marysville Scoping Meeting	California Department of Fish and Game	Tricia Bratcher	5/3/12
	Tehama Colusa Canal Authority	Jeff Sutton	5/3/2012
Oral Comments at the Los Banos Scoping Meeting	20th Congressional District	Congressman Pete Costa	5/22/12
	California Water Alliance	Aubrey J.D. Bettencourt	5/22/12
	California Women for Ag and American Ag Women	Pamela Sweeten	5/22/12
	Circle A Farms	Chris Hurd	5/22/12
	City of Coalinga	Ron Ramsey	5/22/12
	City of Coalinga	Darrel L. Pyle	5/22/12
	City of San Joaquin	Cruz Ramos	5/22/12
	County of Fresno	Judy Case	5/22/12
	Firebaugh Canal Water District	Jeff Bryant	5/22/12

Type of Comment	Affiliation	Name	Date of Comment
Oral Comments at the Los Banos Scoping Meeting (continued)	Fresno Community Food Bank	Dayatra Latin	5/22/12
	San Luis Water District	Martin McIntyre	5/22/12
	Water 4 All	Piedad Ayala	5/22/12
	Water 4 All	Gracy Villavazo	5/22/12
Comment Cards from the Los Banos Scoping Meeting	California Water Alliance	Aubrey J.D. Bettencourt	5/22/12
	California Women for Ag and American Ag Women	Pamela Sweeten	5/22/12
	City of Coalinga	Darrel L. Pyle	5/22/12
	County of Fresno	Judy Case	5/22/12
	Clark Bros. Farming	Allen Clark	5/22/12
	Doubler & Sons Family Ranch	John Garza	5/22/12
	Empresas Del Bosque	Joe DelBosque	5/22/12
	Fresno Community Food Bank	Dayatra Latin	5/22/12
	Hall Management Corporation	Rodolfo Villa C.	5/22/12
	Harris Farms, Inc.	Luis A. Monad	5/22/12
	Rodriguez Familia Ranch	Marisela Rodriguez	5/22/12
	Tolmachoff Farms	David Tolmachoff	5/22/12
	Water 4 All	Piedad Ayala	5/22/12
	Water 4 All	Gracy Villavazo	5/22/12
	Westside Harvesting	Alonzo Garcia	5/22/12
	Westside Harvesting	David Aguilar	5/22/12
	Westside Harvesting	Jose T. Torrer	5/22/12
	Westside Harvesting	Baltazar Rodriguez	5/22/12
Written Scoping Comment – State Agencies	Delta Stewardship Council	P. Joseph Grindstaff	6/27/12
Written Scoping Comment – Local Agencies	City of Folsom	Ryan S. Bezzera	6/28/12
	City of Roseville	Pauline Roccucci	6/28/12
	City of Folsom, City of Roseville, Sacramento Suburban Water District, and San Juan Water District	Ryan S. Bezzera, Derrick Whitehead, Robert Roscoe, and Shauna Lorance	6/28/12

Type of Comment	Affiliation	Name	Date of Comment
Written Scoping Comment – Local Agencies (continued)	Contra Costa Water District	Leah Orloff	6/28/12
	East Bay Municipal Utility District	Richard G. Sykes	6/26/12
	Glenn-Colusa Irrigation District	Andrew M. Hitchings	6/20/12
	Kern County Water Agency	James M. Beck	6/28/12
	Oakdale Irrigation District, South San Joaquin Irrigation District, and Stockton East Water District	William C. Paris, III and Karna E. Harrigfeld	6/28/12
	San Juan Water District	Shauna Lorance	6/28/12
	San Luis Delta Mendota Water Authority, State Water Contractors, and Westlands Water District	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham	6/28/12
Written Scoping Comment – Interest Groups	Catholic Charities in the Diocese of Fresno	Kelly Lilles	5/23/12
	Center for Environmental Science, Accuracy, & Reliability	Leah Zabel	6/28/12
	Coalition for a Sustainable Delta	William D. Phillimore	6/28/12
	Fresno County Farm Bureau	Ryan Jacobsen	6/25/12
	Natural Resources Defense Council, The Bay Institute, Northern California Council Federation of Fly Fishers, San Francisco Baykeeper, Pacific Coast Federation of Fishermen's Association, Planning and Conservation League, Winnemem Wintu Tribe, Sierra Club California, and Sacramento River Preservation Trust	Katherine S. Poole, Gary Bobker, Mark Rockwell, Jason Flanders, John Mertz, Zeke Grader, Jonas Minton, Gary Mulcahy, and Jim Metropulos	6/28/12
	Northern California Water Association	David J. Guy	5/29/12
	Stone Land Company	Justin Dutra	

Type of Comment	Affiliation	Name	Date of Comment
Written Scoping Comment – Individual	Farmer near Firebaugh, California	Todd Allen	5/30/12
	Farmers near Firebaugh, California	Mark and Mary Fickett	6/27/12
	Resident of Fresno	William M. Ragsdale	6/11/12
	Farmers near Firebaugh, California	Frank and Judy Williams	6/26/12

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Federal Agency	Congressman Jim Costa, 20th Congressional District	Among the highest priorities in our valley is water, water for farmers, for our campesinos, for our farm communities…Because of the flawed regulations that were formed in 2008 and 2009, blame was placed on our valley for the decline of fisheries in the Sacramento and San Joaquin River delta. Only in recent times, through the National Academy of Science and other studies that have come out, has it demonstrated that there are many other factors, stress factors that are contributing to the decline of fisheries in the delta…Our water -- our local water agencies are working together and over the last three years developed a strategy to bring more water for our valley… The administrative strategy, to create more flexibility in the operations of the projects, have also provided results this year, going from a 30 percent water allocation on the west side to a 40 percent, going from 45 percent water allocation among Friant water users to 55 percent, but that's not enough. But our valley cannot live with half of it's water supply on a year to year basis…more water equals more jobs…The remanded court decision must, as Judge Wanger said, take into account the social and economic impacts to our valley…These regulations were called into question by Judge Wagner. As part of our legal strategy the judge found that key provisions of the biological opinion were arbitrary – were capricious – were bad – and were not in accordance with the law. And that's why the judge remanded the Bureau of Reclamation in essence to go back to the drawing board. Judge Wanger also held that the balancing the need of protected species and the needs of the people are important public policy choices and judgments should be made. As one of your representatives, I remain committed to fighting the daily fight to bring a reliable, clean, and sustainable water supply to the people of our valley. Reliable – long-term supply. So I urge all of us here today as well as my colleagues in Congress to ask the administration to take a hard look at these flawed regulations.
State Agency	P. Joseph Grindstaff, Delta Stewardship Council	…the Council requests that water supply reliability as well as the ecosystem be considered under the impacts analysis. It is the policy of the state of California that the coequal goals be considered together without giving deferential treatment to either goal. The Council also requests, to the extent that it may be appropriate as part of this EIS, an expansion of the fish species to be analyzed; at a minimum, being consistent with the list of fish species being analyzed in the Bay Delta Conservation Plan. The Delta Stewardship Council's draft Delta Plan does not attempt to protect, restore and enhance the Delta ecosystem for only specific species, rather the Delta Stewardship Council believes a more holistic approach to the ecosystem and all its native fish species would be more effective. The Bureau of Reclamation may now have an opportunity to expand the analysis of the long-term operations beyond only those fish species currently listed, and include species, such as longfin smelt, which have a high likely hood of becoming listed sometime in the near future. Consistency of the fish species between this EIS and the BDCP should harmonize the analysis efforts and minimize any duplicate analysis between the operation of the two very related projects. Consistency with the BDCP fish species will add several additional fish species to the EIS, including the aforementioned longfin smelt, white sturgeon, Sacramento splittail, river lamprey and Pacific lamprey.
State Agency	Mike Ford, Department of Water Resources	…how you define baseline will measure the impacts of the proposed project... there's been a lot of discussion or different views expressed about the economic impacts of BiOps…So I think that question of baseline -- or no project condition is very important…
State Agency	Tricia Bratcher, Department of Fish and Game	So the BO also address some of the state water project elements, so how does that get integrated into this? This is not an EIS/EIR? Shasta Lake Water Resource Investigation… with that be included… how do you kind of work out the cumulative effects like that because Shasta Lake will use the 2009… long-term ops. We'll use those RPAs and… terms of the flow recommendations to do their modeling. So are those the kind of flows that are in question here?

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Local Agency	Ron Ramsey, City of Coalinga	Valley fever, a lot of people don't know what valley fever is. It's in our ground around Coalinga. It's in the whole valley here. And when you have crops on that land, the dirt doesn't come up… There's people I work with that have died of valley fever. It's like a cancer…It eats you up and it's not good at all. Water is our City's life blood. Our economy is heavily driven by agriculture. For our city to flourish we need agriculture to succeed...And we would like Reclamation to look at ways to avoid these impacts where possible. .
Local Agency	Darrel L. Pyle, City of Coalinga	In our city, economic development and job creation are a high priority. Our attempts to diversify our economy are also limited by our unpredictable annual water delivery. We fear that we will succeed in attracting new industries to town but then lose them due to our inability to deliver them water. Agriculture is key but we do need to diversify the economy, and it's also impacted the same as ag. Based on water limitations.
		We are a community of 19,000 who are 100% dependent on Bureau water for our potable supply. Our economy is constrained by the unpredictable actual annual water delivery. Air quality is negatively impacted on short water delivery years.
Local Agency	Ryan S. Bezzera, City of Folsom	Project description – Conserved water – The EIS's project description must assume that the City will use, either in its service area or by transfer to a third party, all water that the City conserves pursuant to Senate Bill 7 (SB 7) that the California Legislature enacted in 2009. Under Water Code section 1011 and SB 7 (see Water Code section 10608.8(a)(1)), urban retail water suppliers retain the rights to water that they conserve. To the extent that water that the City conserves pursuant to SB 7 is water delivered under a CVP contract, CVPIA section 3405 authorizes the City to transfer all water subject to such a contract within the area of origin. Water-supply analysis – The EIS's analysis of the proposed project's impacts must separately assess its impacts on the City's supplies under the two water-right water contracts with Reclamation under which the City has rights and under the City's subcontract with Sacramento County Water Agency (SCWA) for deliveries under SCWA's CVP water-service contract… Reclamation must ensure that the City's full supplies under these contracts, and the water rights they represent, are satisfied whenever sufficient water is physically available to Folsom Reservoir.
Local Agency	Pauline Roccucci, City of Roseville	The Bureau's EIS must assume that the Bureau will not export American River water that the Bureau diverts under its water-right Permits Nos. 11315 and 11316 unless the Bureau has complied with those permits' Term 14…Term 14 requires that the Bureau meet the City of Roseville's demands through deliveries under our CVP water-service contract with the Bureau before the Bureau exports any water to areas outside of Placer, Sacramento and San Joaquin Counties. The EIS's project description must assume that Roseville will use, either in its service area or by transfer to a third party, all water that Roseville conserves pursuant to Senate Bill 7 (SB 7) that the California Legislature enacted in 2009. Under Water Code section 1011 and SB 7 (see Water Code section 10608.8(a)(1)), urban retail water suppliers retain the rights to water that they conserve. To the extent that water that Roseville conserves pursuant to SB 7 is water delivered under a CVP water-service contract, Central Valley Project Improvement Act (CVPIA) section 3405 authorizes Roseville to transfer all water subject to such a contract within the area of origin. Roseville has certified its Environmental Impact Report (EIR) for its Aquifer Storage and Recovery Program (ASR…The project description in the Bureau's EIS should incorporate deliveries of CVP project water to support Roseville's ASR program under Roseville's CVP water-service contract.

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Local Agency	Ryan S. Bezerra, Derrick Whitehead, Robert Roscoe, and Shauna Lorance City of Folsom, City of Roseville, Sacramento Suburban Water District, San Juan Water District (Folsom, Roseville, SSWD, SJWD)	... the lower American River has been designated under the federal Wild & Scenic Rivers Act and is one of the few – if not the only – urban river with such a designation. (46 Fed.Reg. 7484 (Jan. 23, 1981).) Project description – Full use of CVP supplies – The EIS's project description should assume that all CVP water supplies available within the American, Sacramento and Trinity River Divisions are used within those divisions' combined boundaries…Consistent with this intent of CVPIA, our agencies, and other agencies within this region, may need to transfer CVP project water among ourselves to address, among other things, future demands, groundwater contamination, environmental concerns or the increasing need for our region to implement integrated management of available water supplies…Accordingly, the EIS's project description should assume that all water subject to CVP contracts within the American, Sacramento and Trinity River Divisions is used within those divisions' combined boundaries. Project description – Area-of-origin laws – The EIS must demonstrate that its project description is consistent with California's area-of-origin laws… Consistent with the area-of-origin laws, Reclamation's operation of Folsom Reservoir must not prevent this region from using the amounts of American River water that is, as those laws put it, reasonably required to adequately supply the beneficial needs of this region. Project description – CVP M&I allocation preferences – The EIS's project description should incorporate implementation of preferences for M&I water-service contract deliveries reflected in Reclamation's current practice, its proposed CVP M&I water shortage policy and its water-right permits for the Folsom Unit.

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Local Agency	Ryan S. Bezerra, Derrick Whitehead, Robert Roscoe, and Shauna Lorance City of Folsom, City of Roseville, Sacramento Suburban Water District, San Juan Water District (Folsom, Roseville, SSWD, SJWD)	Project description – Warren Act contracts – …To date, Reclamation has not approved long-term Warren Act contracts that would allow our region to optimize management of local and regional water supplies. For example, Sacramento Suburban Water District (SSWD) has been required to obtain short-term Warren Act contracts to obtain water available in Folsom Reservoir under the contract that SSWD and Placer County Water Agency (PCWA) executed under PCWA's water rights. There is existing capacity under other agencies' long-term Warren Act contracts sufficient to deliver PCWA water to SSWD and other agencies, but it currently cannot be used for that purpose. Reclamation's project description for the EIS should incorporate long-term Warren Act contracts that allow this region's water supplies to be managed as efficiently as possible. Project description - Restoration projects – The EIS's project description should include identified projects under which restoration funds paid by American River Division contractors are used to restore environmental resources within the division and, specifically, in the designated lower American River. Wild and scenic Lower American River and fisheries – The EIS must analyze the project's impact on the biological, cultural and recreational values that support the lower American River's designation under the Act. These values include the river's fish, which include steelhead and fall-run Chinook salmon. Our agencies have signed the region's Water Forum Agreement, which includes the implementation of an improved flow standard for the lower American River as a key element. Folsom Reservoir levels and intakes – The EIS must analyze the impacts of implementing the proposed project on water levels in Folsom Reservoir to determine: (A) how often the project's implementation would prevent or constrain water-supply deliveries through the reservoir's water-supply intakes; and (B) any land use and socioeconomic impacts that would occur because of any reduced deliveries. Folsom Reservoir water quality – The EIS must analyze the impacts of implementing the proposed project on water temperatures and other water quality parameters in Folsom Reservoir and the indirect environmental and economic impacts associated with the delivery of lower quality water through the reservoir's water-supply intakes. Groundwater quantity and quality – The EIS must analyze the effects of implementing the proposed project on groundwater quantity and quality in this region. These effects could result in impacts in numerous resource categories. To the extent that the proposed project would reduce CVP deliveries within the American River Division, it indirectly would cause increased groundwater pumping….Increased pumping could result in the growth and migration of the region's groundwater contamination plumes, causing at least water quality, soils and socioeconomic impacts. Folsom Reservoir aesthetic, recreation and economics – The EIS must analyze the project's impact on the reservoir's aesthetic and recreational values, as well as the project's resulting impacts on the economic benefits generated by use of the reservoir.
Local Agency	Cruz Ramos, City of San Joaquin	…water means jobs. But water means more than just jobs. The city of San Joaquin is a very, very small community on the west side of Fresno County. Under normal circumstances, that means the water, where we – when we have water, our population, three-quarters of our population, either meets or exceeds the poverty guidelines that the federal government dictates. Our economy is based on agriculture. And agriculture is our life blood. Our people, when they don't have jobs, line up for food…I was one at those long lines for food distribution in the city of San Joaquin. And I was shocked. The irony of us living in an agricultural community, agricultural valley, and we're feeding – we're giving food to the farm workers, food that comes from China. What a shame.

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Local Agency	Judy Case, County of Fresno	We're here to talk about what happens when there is no water on the west side. Workers lost their jobs. And they not only lost their jobs, they had lost jobs that had become permanent, with benefits, so they had health care for their families. Unemployment in Fresno County – we had unemployment up to 43 percent. And people who had worked really hard to purchase their first home had lost it in foreclosure and were put in food lines in which there was foreign food provided. As a county we provide safety net programs to help people that are in a position they can't help themselves and our requests for services soared. Some families were forced to leave the area to look for jobs and for work. And they left with their children, which affected the local schools…Families, to survive, they left the house they had just bought and been hopeful for and moved in with relatives with two and three and four families living in the same house or apartment. Our farm businesses suffered and a large industry that supports farms, farmers, farm workers, from grocery stores to car dealers to suppliers for working on the farms, many of them suffered, many of them ended up closing because they couldn't survive. We also had farmers that when they didn't receive surface water, they turned to ground water to be able to sustain crops. As a result, we continued to have our water tables lower, which has very long term impacts for all of us. …we hope you're able to fully quantify the impacts on all of the people when we don't have a reliable water supply so that they can feed their families and make sure their kids get educated and have all the things we all want. And I do believe there is one environmental impact that hasn't fully been studied and that is when you take water away from the west side, the potential for dust effects that harm human health is much greater…We have a higher incidence of valley fever on the west side, and when the dust is kicked up, the risk is much higher for everybody.
		Without water, there is no farming, no farm jobs, no secondary businesses to support the ag industry, no food production, potential for increased dust events in the westside of the central San Joaquin Valley
Local Agency	Leah Orloff, Contra Costa Water District	As currently implemented, the OMR restrictions are determined using imperfect measurements that are affected by factors, such as the weather, that are outside of the control of the CVP and SWP…. implementation of revised fish protection actions should protect the intended species without placing further undue restrictions on water operations that do not cause such entrainment…Since CCWD has implemented fishery protection measures that already minimize take at its facilities and has fully mitigated for fishery effects in the Delta, it is not reasonable to have CCWD operations be further affected by the OMR flow regulations - regulations that are explicitly intended to limit entrainment at the Banks and Jones facilities. Nor is it reasonable to have OMR regulations expressed in a way that allows CCWD operations to affect Banks and Jones operations when CCWD operations are unrelated to fish entrainment at those facilities…CCWD diversions, which are already fully mitigated, can and should be explicitly removed from the regulation of OMR flows…we believe that this can be done in a way that maintains or improves fish protection and reduces operational constraints on CVP and SWP exports. PROPOSED ALTERNATIVE: An index based on San Joaquin River flow, export pumping at Banks and Jones pumping plants, and status of the Head of Old River Barrier can improve implementation of the current OMR flow regulations. Use of an index provides the same level of protection, is comparable to field data and will eliminate unnecessary complexity in operations. An example of an alternative index is illustrated in the attachment to this letter…the simplified index simulates the currently regulated value, and therefore has equal power for the purpose of fish protection….Alternatively, if implementation of new OMR restrictions relies upon the existing flow gauges, the restrictions should be formulated to explicitly remove the effect of CCWD's operations.
		PROPOSED ALTERNATIVE: CCWD requests that the Environmental Impact Statement (EIS) for the Coordinated Long-Term Operations of the Central Valley Project and State Water Project include CCWD's proposals for removing CCWD's operations from the determination of compliance with OMR requirements.

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Local Agency	Richard G. Sykes, East Bay Municipal Utility District	EBMUD has a strong commitment to sustaining and enhancing the populations of fall-run Chinook salmon and Central Valley steelhead in the Mokelumne River below Camanche Reservoir….EBMUD works closely with the resource agencies in managing the Mokelumne fishery, especially under the framework of the Lower Mokelumne River Partnership (Partnership), which is made up of representatives from the California Department of Fish and Game, the United Stated Fish and Wildlife Service, and EBMUD. The analysis of all alternatives should address the effects of Delta Cross Channel gate closures to enhance in-migration and reduce straying of Mokelumne- and Cosumnes-origin Central Valley Steelhead and Fall Run Chinook salmon. Straying rates of Mokelumne origin salmonids to other systems, particularly the American River, have exceeded 70% in past years based on analysis of coded wire tag returns. In reviewing the data, the Partnership identified several factors that can influence straying including but not limited to tributary flow operations, Delta water management operations (including Delta Cross Channel gate operations), temperature, and planting practices for hatchery fingerlings and smolts…During October, adult salmonids migrating to the Mokelumne may be influenced by Sacramento River flows being diverted through the Delta Cross Channel. Working with operators from EBMUD, Department of Water Resources, and Reclamation, the Partnership developed a number of adaptive management actions to test their effect on stray rates and total escapement. These actions include closures of the Delta Cross Channel gates and attraction releases from Camanche Reservoir. Since implementation of the adaptive management actions, straying of Mokelumne River salmon to the American River has been reduced to levels below 10%. Furthermore, Mokelumne River returns since 2009 have been well above long-term average with 2011 being more than 400% of average. In fact, 2011 Chinook salmon escapement to the river was the highest observed since 1940. The early successes of the adaptive management actions warrant further evaluation within the context of the EIS for the OCAP BO. The analysis of all alternatives should address the role of export pumping in exacerbating entrainment and predation of juvenile Central Valley Steel head and Fall Run Chinook entering the Delta from the Cosumnes and Mokelumne Rivers. Current actions under BOs that are to be replaced are focused to a large degree on protecting salmonids originating from the Sacramento basin. A fact often overlooked is that naturally produced salmonids from the Mokelumne and Cosumnes rivers have no migratory alternatives other than the central Delta. Therefore, analysis of alternatives should address and mitigate impacts to migrating juvenile salmonids originating from the Mokelumne and Cosumnes rivers...Mortalities are generally attributed to increased residence time, a longer migration route, reverse flows, altered salinity gradient, predation, elevated water temperatures, contaminants, and reduced food supply… Cumulative effects regarding entrainment and predation of juvenile Central Valley Steelhead and Fall Run Chinook entering the Delta from the Cosumnes and Mokelumne Rivers should be analyzed for the San Joaquin River Restoration flows including return of Millerton releases via the export pumps. The primary outmigration period of juvenile salmonids from the Mokelumne River is February through June. These fish use the lower San Joaquin River, including portions of the Old and Middle River channels, as a migration corridor to the ocean and are vulnerable to entrainment by flows in these channels towards the export pumps.
Local Agency	Jeff Bryant, Firebaugh Canal Water District	Due to ground water pumping necessary to augment reductions in water supplies in the San Luis unit, the Central California Irrigation District has spent approximately 4.5 million dollars to rehab their conveyance facilities, and that was done -- the damage was done due to subsidence. In addition to the 4.5 million dollars that CCID has spent, they will undertake a program with the county of Fresno to the tune of 2.5 million dollars to study and replace a damaged bridge that has also settled due to the same effects of subsidence…I don't think there's any other alternative to be considered but restoring the water supply to the Central Valley Project.

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Local Agency	Steve Ottemoeller, Friant Water Authority	…San Joaquin River Restoration Program. The program is in place now in terms of development and planning, and there has been modeling…we want to make sure that the analysis of the biological opinions and everything associated with that does include both the river restoration flows that are going to hit the Delta and recapture…
Local Agency	Andrew M. Hitchings, Glenn-Colusa Irrigation District	GCID joins in and incorporates by reference herein the written comments that the Northern California Water Association (NCWA) previously submitted to Reclamation regarding the NOI, by letter dated May 29, 2012.
Local Agency	James M. Beck, Kern County Water Agency	Agency staff has reviewed the NOI. Additionally, Agency staff has reviewed the comments prepared by the State Water Contractors, Inc. and the Coalition for a Sustainable Delta. The Agency joins in all of the comments submitted by these two organizations.
Local Agency	Delaine Shane, Metropolitan Water District of Southern California	… are you seeing any sorts of construction activities proposed? … Are we talking about one or two environmental impact statements…?

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Local Agency	William C. Paris, III and Karna E. Harrigfeld, Oakdale Irrigation District, South San Joaquin Irrigation District, Stockton East Water District	The Scope of the Proposed EIS is Incorrect and Needs to Be Changed. - The Notice indicates that Reclamation operates the Central Valley Project (CVP) in coordination with the State Water Project (SWP) in accordance with the Coordinated Operation Agreement (COA) between the United States and the State of California. (Notice, p. 18858). The Notice goes on to indicate that the proposed action will address continued operation of the CVP, in conjunction with the SWP…and that the purpose of the action is to continue the operations of the CVP, in coordination with the SWP, as described in the 2008 Biological Assessment…The New Melones Unit is not operated pursuant to or in accordance with the COA, and is not otherwise coordinated with the operation of other units of the CVP or SWP. As such, the New Melones Unit of the CVP needs to be excluded from the scope of the EIS process being developed by Reclamation. The Districts asserted in the litigation that the New Melones Unit of the CVP should not be included in the Biological Opinion analyzing the long-term operation of the CVP and SWP. There was no evidence in the Administrative Record supporting the notion that the New Melones Unit is, in fact, operated in a coordinated fashion with other units of the CVP or SWP. To the contrary, the evidence in the Administrative Record, including the 1992 OCAP Biological Opinion, 2004 OCAP Biological Opinion, 2008 OCAP Biological Assessment, and express language of the COA all demonstrated that the New Melones Unit's operation is not included in the Coordinated Operating Agreement (COA), and it is operated as a separate feature…In response, Reclamation submitted a declaration… that Reclamation typically coordinates operations of the CVP and SWP, including the New Melones Unit…did not address how such coordination took place in light of the fact that the operation of the New Melones Unit is not covered by the COA, nor…explain when such coordination began, which is important since Reclamation concluded in 1992 and 2004 that the New Melones Unit was properly not included in the OCAP Biological Opinion since it was operated as a separate unit…the court…determine that inclusion of the New Melones Unit was legally defensible…the Districts vehemently disagree…declaration conflicts directly with that of…dated September 19, 2005…a hardcopy is attached hereto as Exhibit A…PowerPoint presentation prepared by…Reclamation entitled, Forecasting and Operations Advances from a Reservoir Operator's Perspective…a hardcopy is attached hereto as Exhibit B…state New Melones Dam and Reservoir and Friant Dam and Millerton Lake are part of the CVP, but are not operationally integrated into the CVP…….findings of Reclamation concerning the 1992 and 2004 OCAP Biological Opinions, both of which excluded the New Melones Unit since it was operated as a separate feature and was not coordinated with other elements of the CVP and SWP...it must be inferred that such coordination is recent since all prior evidence demonstrates that no such coordination occurred. Assuming…there is typical and daily coordination between the operation of the New Melones Unit and the other elements of the CVP and SWP, Reclamation must demonstrate the time, rationale, and purpose for such change. The Districts, which are intimately familiar with all legal, factual and policy aspects concerning the operation of New Melones, are frankly unaware of any change made by Reclamation which lead to or supports such coordination. Moreover, the Districts are unaware of any instance of coordination, let alone coordination that could be described as typical or daily.…Absent the provision of policies, procedures and facts which demonstrate actual coordination between the operation of the New Melones Unit and the other elements of the CVP and SWP, Reclamation must amend its scope to exclude the New Melones Unit in its EIS. Even if such evidence of coordination can be presented, Reclamation should choose to exclude New Melones and conduct environmental review and a separate biological opinion for New Melones Unit operation.

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Local Agency	William C. Paris, III and Karna E. Harrigfeld, Oakdale Irrigation District, South San Joaquin Irrigation District, Stockton East Water District	The Project Description and Modeling of Both Baseline Conditions and Conditions - Expected Under the Evaluated Reasonable and Prudent Alternatives Must Identify an Operations Plan that Will Work Through the 1928-1934 Drought Sequence. Reclamation's 2008 BA correctly noted that the 1997 Interim Plan of Operations (NMIPO) was not designed or intended to establish the permanent operating plan for New Melones…Further, the 2008 BA stated that the drought year sequence used to evaluate risk had changed from the 1987-1992 sequence to the 1928-1934 sequence. ..As a result of these two changes, Reclamation developed a Transitional Operating Plan (TOP) which utilizes three allocation bands for high allocation years, mid allocation years, and conference years ... The problem with the TOP is that the conference year contains no rules at all as to how the New Melones Unit will be operated. Indeed, under the conference year band, there is no stated plan at all for deliveries to the Districts, water quality objectives, fisheries or other requirements. Instead, in a conference year, Reclamation would meet with USFWS, stakeholders, DFG, and NOAA Fisheries to coordinate a practical strategy to guide New Melones Reservoir Operations……This is not an operations plan that can be modeled, evaluated and altered; this is a plan to develop a plan. Moreover, there is no guiding or overarching principle that will inform a conference year operation save that it is a practical strategy.…Certainly, any operations plan developed is unlikely to work through the 1987-1992 drought sequence, and the use of a conference year or other non-specified set of procedures to be determined by coordination of all affected parties is reasonable. However, such conference years must be an exception to the operating plan, not part of the operating plan itself. The inclusion of the conference year band as part of the TOP itself, instead of as an exception to the TOP, is inappropriate and must be rectified…First, Reclamation must identify how often the conference years are expected to occur. Second, Reclamation must identify the available deviations from the operations plan that could be considered in a conference year. This is extremely important since not all deviations are legal or appropriate and some depend upon the actions of third parties…that when NMFS and Reclamation modeled the conference years, it did so by making a host of assumptions that would require the approval of the State Water Resources Control Board, including the relaxation of the dissolved oxygen requirement at Ripon and waiver on meeting flow requirements at Vernalis. Reclamation should provide a discussion of whether it expects such waivers and relaxations to be granted, and why. NMFS and Reclamation also assumed that deliveries to the Districts would be less than required under CVP contract and by law. …Reclamation's discretion to limit deliveries to SEWD is extremely limited, and is non-existent as to OID and SSJID. Assuming Reclamation may consider reduced deliveries to the Districts as part of any conference year, it must disclose its lack of discretion and explain under what terms and conditions it would expect the Districts to accept deliveries that are less than they are entitled to by law and contract. …assuming that the New Melones Unit is integrated with the operation of the rest of the CVP and SWP, Reclamation should identify actions that other elements of the CVP and SWP could take in an effort to achieve water quality and other requirements that Reclamation chooses to meet via the New Melones Unit. While no other element of the CVP or SWP could assist in meeting Reclamation's requirements in the Stanislaus River itself, such elements could be brought to bear to meet or assist in meeting requirements downstream of the confluence of the Stanislaus and San Joaquin Rivers.

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Local Agency	William C. Paris, III and Karna E. Harrigfeld, Oakdale Irrigation District, South San Joaquin Irrigation District, Stockton East Water District	Reclamation must develop an actual operations plan that is able, as identified in the 2008 BA, to be successfully-utilized through the 1928-1934 multi-year drought sequence. Such plan must identify the rules by which the New Melones Unit will be operated and be supported by modeling using CalSimII. Without the benefit of a baseline condition, it will be impossible for the agencies to accurately depict not only the environmental impacts, but also to develop and compare the range of alternatives…Reclamation must develop, identify and use an operations plan which (1) spells out how the New Melones Unit will be operated in all year types, and (2) is capable of successfully working through the 1928-1934 drought cycle. Districts Have Developed an Operating Plan that Works Through the 1928-1934 Drought Sequence Which Reclamation Should Adopt. - Prior to the development and approval of Reclamations 2008 BA, OID and SSJID jointly developed an operating plan for the New Melones Unit, entitled New Melones Operating Plan Current Performance and Proposed Transitional Plan. (Districts' Plan)(A hardcopy is attached hereto as Exhibit C;…The Districts' Plan was submitted to Reclamation in 2006, but as of this date, Reclamation has yet to provide any official comment. The Districts have collectively made modifications to the Districts' Plan as a result of the Stockton East Water Dist. v. U.S., 583 F.3d 1344 (Fed. Cir. 2009) litigation in the Federal District Court of Claims…The Districts' submitted this revision to Reclamation in February 2012 and, to date, Reclamation has yet to provide any official comment (A hardcopy is attached hereto as Exhibit D). Using the 1928-1934 drought sequence as its worst-case scenario from a planning perspective, the Districts' Plan is designed and intended to (1) fully comply with OID and SSJID's entitlements under the 1988 Agreement, (2) fully meet all water quality and flow requirements at Vernalis, (3) provide a base instream fishery flow under all conditions, and (4) provide a minimum water allocation for Municipal and Industrial (M&I)- Public Health and Welfare uses to SEWD in all years and other CVP contractors when the New Melones Index exceeds 1400 TAF. The Districts' Plan achieves these goals by first providing an instream schedule for fishery protection, and then adding water on to the fishery schedule if necessary to meet water quality or flow objectives at Vernalis. Second, the Districts' Plan establishes fixed rules for the delivery of water to SEWD and CVP contractors which provides them with some water in all years, including full contractual allotments in wetter years, but which also restricts deliveries for agricultural purposes in the driest years. These deliveries are not strictly compliant with the terms and conditions of the CVP contracts, but for the purposes of finding a workable future operating plan, have the backing and support of SEWD in light of the overall changes to the management of the system which make the system more reliable and which provide SEWD with more water in more years than other operating plans. Third, the Districts' Plan recognizes that Reclamation has no discretion regarding the exercise of OID and SSJID's rights and provides them with water in strict compliance with the terms and conditions of the 1988 Agreement… The Districts recommend that Reclamation adopt the Districts Plan (as revised in February 2012) as the operating plan for New Melones, and that the EIS be conducted using the Districts' Plan as the baseline. If Reclamation Refuses to Adopt the Districts' Plan, Reclamation Must Include an Evaluation of Districts' Plan as An Alternative to the TOP. - If for any reason Reclamation does not adopt the Districts' Plan as its own operations plan for the New Melones Unit, in place of the TOP which is legally and factually deficient, Districts hereby submit that Reclamation must evaluate and consider the Districts' Plan as a reasonable alternative to the TOP…

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Local Agency	William C. Paris, III and Karna E. Harrigfeld, Oakdale Irrigation District, South San Joaquin Irrigation District, Stockton East Water District	Reasonable Alternatives Must Not Involve Limitations in Water Use By The Districts Which Are Beyond Reclamation's Discretion and Which Are Not Supported By Facts. - …Reclamation must make it clear that it has no discretion over the amount of water OID and SSJID are entitled to, and that its discretion over deliveries to SEWD is severely limited based upon recent interpretation of the terms and conditions of SEWD's CVP contract. When preparing its EIS, Reclamation must not use or rely upon any future study, such as the 2030 land use study, or prior occurrence, that suggests that OID and SSJID will not consumptively use all of the water allotted to them. Usage within the Districts is changing to more permanent, tree-based agriculture, which require a consistent supply of water regardless of the year-type. Further, the Districts are expanding their boundaries and transferring more water. There is no basis upon which Reclamation can reasonably claim that OID and SSJID's overall usage in future years will be reduced, or that OID and SSJID will agree to share the pain in any dry or critically dry year type…Reclamation must reject any alternative that proposes to restrict, cut or otherwise reduce deliveries to OID and SSJID in any fashion not expressly identified in the 1988 Agreement, or that proposes to restrict, cut or otherwise reduce deliveries to SEWD in any fashion not expressly called for in its CVP contract. Reclamation simply has no discretion over these items and it is misleading at best and disingenuous at worst, to identify a reasonable alternative that includes such limitations. Temperature Modeling Done Must Be Done Using the Best Available Science, Which For the New Melones Unit Is the San Joaquin River Water Temperature Model. - To meet its legal requirement to utilize the best available science and data, Reclamation must use the San Joaquin River Water Temperature Model by Avry Dotan and Resource Management Associates. Reclamation Cannot Utilize or Rely Upon Any Salmon Model Developed By the California Department of Fish and Game, Nor Any Data or Studies that Are Based Upon Such Modeling. - The California Department of Fish and Game (DFG) has been working on a model predicting the relationship between flow and salmon smolt survival for several years now. Version 1.0, developed in 2005, was subjected to heavy peer review criticism and resulted in the development of Versions 1.5 and 2.0. However, neither of those versions has been subjected to peer review…Reclamation must not use the salmon model directly, nor rely upon any study, paper, data or report that is derived, in whole or in part, from the use of such model.
Local Agency	Shauna Lorance, San Juan Water District	Project description - Term 14 - Reclamation's EIS must assume that Reclamation will not export American River water that Reclamation diverts under its water-right Permits Nos. 11315 and 11316 unless Reclamation has complied with those permits' Term 14…This term requires that Reclamation meet San Juan's demands through deliveries under San Juan's multiple contracts with Reclamation before Reclamation exports any water to areas outside of Placer, Sacramento and San Joaquin Counties. Project description - Conserved water - The EIS's project description should assume that all CVP water supplies available within the American, Sacramento and Trinity River Divisions are used within those divisions' combined boundaries…the EIS's project description must assume that San Juan will use, either in its service area or by transfer to a third party, all water that San Juan conserved pursuant to Senate Bill 7 (SB 7) that the California Legislature enacted in 2009. Under Water Code section 1011 and SB 7 (see Water Code section 10608.8(a)(1», urban retail water suppliers retain the rights to water that they conserve. To the extent that water that San Juan conserves pursuant to SB 7 is water delivered under a CVP water-service contract, CVPIA section 3405 authorizes San Juan to transfer all water subject to such a contract within the area of origin. Water-supply analysis - The EIS's analysis of the proposed project's impacts must separately assess its impacts on San Juan's supplies under its pre-1914 water rights (as reflected in the April 12, 1954 Contract For Relocation, Rearrangement Or Alteration Of Facilities, Contract No. DA-04-167 -eng-61 0) and its supplies under its CVP water-service contract. Reclamation must ensure that San Juan's full supplies under its pre-1914 water rights are delivered whenever sufficient water is physically available in Folsom Reservoir.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	The proposed project operations will be materially different from the operations described in the 2008 biological assessment. Among other changes, the description of operations must include implementation of the San Joaquin River Restoration Program, the Bay Delta Conservation Plan, and new Water Quality Objectives related to San Joaquin River flow. In addition, it should include operations allowing greater opportunities to transfer water through the Delta. The new biological assessment and new biological opinions must also reflect new scientific data that has become available since 2008. These data include information related to the adverse impacts caused by nutrients discharged from wastewater treatment plants, the adverse, extra-ordinary impacts of predation, the lack of identifiable adverse impact of pumping by the CVP and SWP, and the lack of identifiable adverse impact associated with changes in the location of X2 during the fall months. The changes in operations and additional scientific data will require new analyses of the effects of project operations. The Public Water Agencies submit that these new analyses should ultimately result in significantly different conclusions regarding the effects of CVP and SWP operations on listed species, and a different decision by Reclamation, than occurred in 2008 and 2009. The proposed action should not, and presumably will not, include components of the existing opinions found to be unlawful. As the ESA consultation progresses, including particularly preparation of a new biological assessment, Reclamation should likewise be able to define a proposed action and possible alternatives to be included in its NEPA analysis. The Public Water Agencies request an opportunity to provide additional comments when and as Reclamation does so.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	…SLDMWA and SWC will be deemed cooperating agencies for this NEP A process, with specific responsibilities to be set forth in a memorandum of understanding…SLDMW A and SWC would be deemed designated non-Federal representatives in the related section 7 consultation….In addition, it may be appropriate for other local public agencies that are members of the SLDMWA or SWC to serve as cooperating agencies, including Westlands, The Metropolitan Water District of Southern California, the Kern County Water Agency, and Santa Clara Valley Water District. Several member agencies will be contacting Reclamation regarding cooperating agency status. …Reclamation, FWS, and NMFS must engage in a fundamental reanalysis of the effect of CVP and SWP operations on the listed species, and the necessity for and efficacy of any measures intended to address such effects. For their part, FWS and NMFS must do such reanalysis and issue new biological opinions. For its part, Reclamation must consider those new opinions, and make a determination of its ESA obligations. In performing these tasks, all the federal agencies should carefully consider the data and analysis of impacts and alternatives produced through the NEPA process. A new biological assessment is necessary both because of new scientific data and studies that have become available since 2008, and because of changes in current and planned project operations since 2008. Among other recent information, new science since 2008 includes life-cycle models, analyses of ammonium impacts on the food web, and analyses addressing the need for a fall X2 measure…The BDCP is expected to provide the basis for endangered species permits for, and a biological opinion regarding, in-Delta operations of the SWP and CVP beginning in about 2025…Elements of the BDCP not involving CVP and SWP operations will improve conditions for listed species even before new facilities become operative in 2025. Also, the State Water Resources Control Board (State Water Board) is in the process of revising its existing Bay-Delta Plan…the Public Water Agencies suggest that the reconsultation, and the related NEPA review, address project operations until in-Delta CVP and SWP operations are covered through the BDCP permits and BDCP-related biological opinions. …If after consultation with FWS and NMFS Reclamation concludes that project operations will not jeopardize the listed species or adversely modify their critical habitat, then no major changes to the regime governing project operations should be required, and hence there would be no significant effects on the existing human environment triggering the need for an EIS. In that circumstance, an environmental assessment would likely suffice to meet NEPA's requirements. The NOI indicates that Reclamation has decided to prepare an EIS. That is a discretionary choice NEPA allows, even if upon further analysis the likely environmental impacts are revealed to be minor…if the new consultation results in a finding of jeopardizing effect or adverse modification of critical habitat, then Reclamation must consider what reasonable and prudent alternatives (RP As) to proposed operations are both necessary and efficacious. If Reclamation concludes that major changes to project operations will be required in order to avoid jeopardizing listed species or adversely modifying their critical habitat, then the scope of Reclamation's task to meet NEPA's requirements will increase substantially…Reclamation would then be duty bound to consider the impacts from changes in project operations on the quality of the human environment, as well as alternatives that may lessen those impacts while still meeting the requirements of the ESA. That will require an EIS…Information developed in the NEPA process should inform and improve the ESA consultations. Likewise, information developed during ESA consultation should be considered for the NEPA process.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	It appears from the NOI that Reclamation may intend to analyze in a single EIS the effects of any changes to CVP and SWP operations for both the delta smelt and salmonid species. Under the remand schedules set by the court in the two cases, the entire remand process related to delta smelt must be completed by December 1, 2013, while even a draft salmonid biological opinion is not due to be completed until October 1, 2014. Hence, unless Reclamation and NMFS complete the remand required by the judgment in the Consolidated Salmonid Cases much more quickly than the court's schedule would require, a change in schedule will be necessary to accommodate a combined analysis integrating all the listed species. Depending upon further clarification and discussions with Reclamation, FWS, and NMFS, the Public Water Agencies would consider supporting a change in the remand schedules if reasonably necessary for the purpose of allowing an integrated analysis covering all the listed species. Purpose And Need - … Compliance with the ESA should not be included in the purpose of the proposed action. Instead, in the context here, providing water supply as fully as possible while still complying with the ESA gives rise to the need for the action…Reclamation's present NEPA review should therefore be keenly focused on identifying actions it and DWR can take to better serve the water supply purposes of the projects while still meeting the requirements of the ESA. Reclamation's analysis must consider what effect the coordinated operations of the CVP and SWP actually have on species survival and recovery, what measures are proposed to reduce or compensate for such effects, what the data show about the likely efficacy of those measures, and what other effects those measures will cause including through reductions of water supply. That analysis should distinguish between actions that are necessary to comply with the mandates of the ESA, and other actions that may provide some additional protection or benefit for listed species, but are not necessary to comply with the ESA. The statement of purpose and need should make clear that an action alternative under which operations will comply with the ESA with minimal water supply impacts would be deemed superior to an action alternative under which operations will comply with the ESA but cause substantial water supply impacts…the Public Water Agencies reject any suggestion that the conclusions of the existing biological opinions regarding effects on listed species are a legitimate starting point for the NEP A process or the new consultations.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Affected Environment - …The condition of the affected environment includes the presence of a suite of stressors other than project operations that affect listed species. It also includes conditions within the service areas that are dependent upon water deliveries from the CVP and SWP….We agree that the directly affected environment includes all of the CVP and SWP service areas, as well as the areas where CVP and SWP facilities are located.…The affected environment should include the area of and conditions within the Delta, and the Sacramento and San Joaquin river watersheds. The affected environment will encompass areas extending beyond the CVP and SWP service areas as well. For example, reductions in water supplies exported from the Delta may increase demands on Colorado River water as an alternative supply for Southern California.…there are many historic and existing factors and conditions that affect the survival and recovery of listed species, factors that are unrelated to the operations of the projects (e.g., loss of habitat, upstream water use and diversions by other water users, alterations in land uses, municipal and industrial discharges, exotic species etc.). Those factors and conditions should be carefully described as part of the affected environment so that the effects of future project operations are considered in the appropriate context. While the historic changes in the Delta and throughout the area of analysis have occurred and may be identified to set the stage, the impacts analysis must not attempt to attribute these past changes and existing impacts to any action alternative. Instead, an accurate and complete description of existing conditions is essential because the effects of the no action alternative are measured against the existing affected environment (e.g., not the environment that existed before the projects began operations). No Action Alternative - the no action alternative should be defined to include operations consistent with Reclamation's and DWR's obligations and all legal requirements except the requirements of the ESA.…In the EIS, Reclamation must compare the environmental consequences of the no action alternative to the environmental consequences of the action alternatives. With respect to consequences for listed species, that comparison should measure and disclose how many more fish are expected to survive and reproduce under one scenario as opposed to another. For example, if reverse flows in Old and Middle rivers are limited by other existing non-ESA regulations but not by additional measures under the ESA, what are the expected effects on population abundance? If additional restrictions on such flows are imposed under the ESA, what is the expected affect on abundance of listed species? Do other measures that do not involve restrictions on project operations, such as habitat restoration, offer greater promise of improving abundance? The results of these analyses may then be considered together with the other environmental consequences associated with various alternatives, including consequences related to differences in water supply…

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Proposed Action - …Reclamation should at least consider defining the relevant Federal action subject to NEPA review to include the actions of FWS and NMFS in issuing the new biological opinions, as well as any role they reserve for themselves in implementing any measures imposed in the new biological opinions…First, Reclamation does not yet know the outcome of reconsultation, and should not presume at this point that any reasonable and prudent alternatives are needed to avoid jeopardizing the continued existence of listed species or the adverse modification of designated critical habitat. Furthermore, many of the specific components of the 2008 FWS and 2009 NMFS RPAs were found unlawful, and hence are poor candidates for inclusion in a proposed action…It may be appropriate to include some elements of the RPAs in the existing BiOps in potential alternatives for discussion and analysis, but the arbitrary and illegal nature of those measures would provide a sound basis for rejecting them. The NOI states that the proposed action will not consider alternatives that would require future studies. However, NEPA requires new studies where the available information is incomplete, unless the agency can make specific findings of exorbitant cost and infeasibility. The Public Water Agencies submit that a scientifically rigorous analysis of the effects of CVP and SWP operations would likely conclude that those operations do not jeopardize the listed species or adversely modify their critical habitat. Accordingly, the Public Water Agencies suggest that for NEPA review Reclamation define the proposed action as the continued operation of the projects, including existing, valid regulatory requirements, subject to lawful requirements of the incidental take statements in new biological opinions, without major changes to project operations imposed under the ESA. That proposed action, measured in comparison to the no action alternative, should have only modest environmental impacts. That proposed action would also meet the purpose and need described above. Action Alternatives - …The Public Water Agencies urge Reclamation to consider measures that may benefit the survival and recovery of listed species that do not involve modifications to project operations…There have been numerous scientific developments since the BiOps and their RPAs were issued…new scientific understanding of the various stressors and means to alleviate their impacts on listed species must be evaluated as part of the best available environmental data for developing alternatives. Attached hereto as Exhibit B is a list of some of the recent scientific articles issued since the 2009 BiOp was released…the alternatives should allow for adequate water deliveries and prevent significant impacts to public health and the human environment, and also explore various methods to sufficiently maintain and protect the listed species and their critical habitats. Thus, alternatives that simply focus on flow regimes or decreasing water exports would be inappropriately narrow…Reclamation is required to consider potentially reasonable alternatives beyond its own jurisdiction and to consider the jurisdictions of other agencies (Federal and otherwise) when determining what reasonable alternatives should be considered.…Such alternatives may include actions within the jurisdiction of agencies such as the State Water Board and the Regional Water Quality Control Boards, to address water quality habitat stressors created by the discharge of pollutants and contaminants. Alternatives may also include actions within the jurisdiction of the California Department of Fish and Game and the Fish and Game Commission, to address predator stressors created by implementation and enforcement of the bass fishing regulations.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Alternatives For The Protection Of All Listed Fish Species In The Delta - General measures should be included as alternatives to decrease the need to rely on curtailing exports by the projects. For example, Reclamation should consider methods for reducing the populations or impacts of alien species/predator species, such as striped bass…Alternatives that regulate smaller water diversions, especially unscreened diversions, should also be considered. It would also be appropriate to evaluate alternatives that require and implement an alternative conveyance, and/or reduce toxic chemicals… Alternatives That Address Specific Concerns Related To The Delta Smelt - a. X2 Location Management Should Not Be Considered Because It Is Not A Reasonable Alternative - …As further discussed in the document attached hereto as Exhibit C, the LSZ [Low Salinity Zone] only weakly overlaps the delta smelt's habitat, which is comprised of a multitude of biotic and abiotic characteristics. In light of the analysis in Exhibit C as well as the thorough rejection of the Fall X2 Action by the Court, Reclamation should not commit to an inappropriate overemphasis of the LSZ's influence… Food Availability For Delta Smelt - Three recent life-cycle modeling studies (Maunder & Deriso 2011, MacNally et al. 2010, and Miller et al. 2012) found that food availability was a significant driver of delta smelt abundance. Consistent with these modeling efforts, the available scientific data from CDFG surveys show evidence that zooplankton food supplies for delta smelt are an important factor affecting the species' population dynamics. By contrast, these studies also show that the location of fall X2 and associated estimates of abiotic habitat area are not strong predictors of delta smelt population dynamics. Food availability could be improved through alternatives that require: wetlands restoration, particularly salt marsh work, controlling ammonia discharges … and nutrient inputs (i.e., total N inputs related to ammonium loading) rather than using flows to dilute the pollution; controlling the *Corbula amurensis* clam…controlling aquatic macrophytes; and/or controlling blooms of toxic cyanobacterium *Microcystis aeruginosa* … A Combination Of Turbidity Conditions And Spring Flow Should Be Evaluated, Rather Than Just Focusing On OMR Flow Alone - The best available scientific data also confirm that imposing OMR flow controls alone, without simultaneous consideration of other factors affecting species geographic location and abundance, is insufficient. For the protection of delta smelt, in particular, the correlation of normalized salvage as a function of both turbidity and OMR flow shows that during conditions of low turbidity (i.e., clear water), salvage rates are low even when OMR is highly negative. This may occur because delta smelt avoid open waters and mid-channel areas where they are subject to higher predation and other stressors…Importantly, OMR flow controls imposed in a vacuum do not provide any particular benefit to the species. The best available scientific data show that OMR flows have application in reducing entrainment, when used in combination with turbidity triggers and normalized salvage. Based upon this information, consideration should be given in the NEPA process to evaluating the environmental effects of an alternative action to protect delta smelt based upon coupling normalized salvage, turbidity and flow regimes. Using this information, alternatives can be developed to provide for the lowest salvage at the lowest possible water cost. Another important question is whether entrainment has population level effects, and if so under what circumstances. Any restrictions on OMR to limit entrainment should be limited to circumstances where doing so is necessary to avoid meaningful population level effects…

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Conclusion Re Fall X2 Productivity in the LSZ has been drastically limited by springtime suppression of phytoplankton blooms from ammonium loading and feeding by the *Corbula amurensis* clam, which has resulted in a reduced carrying capacity in the Suisun Bay region…the delta smelt occupies a much larger area than just the LSZ…These and other factors show that regulatory efforts should be directed toward life-cycle modeling related to the relevant fish species to help better determine what factors (e.g., ammonium loading and food supply) are contributing to reductions in delta smelt abundance and how those factors can be addressed to improve the health and numbers of the species… Alternatives That Address Specific Concerns Related To Salmonids – a. Temperature Control Adequate temperatures need to be maintained for successful spawning, egg incubation, and fry development (between 42.5 and 57.5°F)… Recreational And Commercial Fishing The potential effects on listed species of recreational and commercial fishing should also be very carefully evaluated. Ocean harvest is one of the dominant factors affecting Salmonid populations… Ocean Conditions Ocean conditions directly tie into ocean survival of salmonids. The NRC has explained that patterns in atmospheric temperature, wind, and precipitation drive ocean temperatures, mixing and currents, which in turn control growth and advection of plankton that provide food for salmon. (NRC 2012, p. 95 (citing Batchelder and Kashiwai, 2007).) Thus, an alternative that increases the diversity of wild and hatchery salmon ocean entrance timing would help ameliorate unfavorable ocean conditions. (NRC 2012, p. 107.) Green Sturgeon -Reclamation should also consider alternatives that address the green sturgeon population. Due to known temporal and spatial differences with salmonids, green sturgeon should be evaluated separately. To better understand these differences, more studies may be needed… Operational Constraints, Non-Project Factors, And Water Demand May Exacerbate Water Supply Impacts From Pumping Restrictions - The level of San Joaquin River flow at Vernalis affects OMR flows, which in turn affects the magnitude of the impact of the OMR flow restrictions... Project demands can affect the level of exports…Storage capacity can restrict or expand exports…Exports at the SWP's Banks Pumping Plant can also be increased when the federal share of San Luis Reservoir fills and pumping capacity at the CVP's Tracy Pumping Plant is available to be used to enhance the pumping capacity otherwise available at the Banks Plant alone…State Water Resources Control Board Water Right Decision 1641 also restricts exports based on several parameters including the export-to-total Delta inflow ratio, thus providing protections to listed species and their habitats. Mitigation Measures - …Some of the actions discussed above in the section on alternatives could potentially also function as mitigation measures. Other types of mitigation measures, including restoration of habitat, could also be explored.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Water Resources, Including Groundwater - Lower export water deliveries translate directly into water losses for urban and agricultural users. Such reduced deliveries compel greater reliance by retail agencies and their customers on groundwater to meet demand not only in dry years, but in other year types when greater exported water deliveries are currently anticipated. In turn, reduced exports and deliveries during more year types and in greater quantities diminish the ability of water managers to replenish and store groundwater when water is available to do so. These circumstances can, and likely will, lead to additional groundwater overdraft (pumping beyond an aquifer's safe yield) throughout the Public Water Agencies' service areas, particularly in agricultural areas. Reduced groundwater levels can also lead to land subsidence that can additionally damage water conveyance facilities and other infrastructure, as has been documented throughout the state. For example, at the recent May 22, 2012 Scoping Meeting held in Los Banos, a speaker from the Central California Irrigation District stated that the District has spent $4.5 million to rehabilitate its conveyance facility, due to land subsidence resulting from groundwater overdraft and is involved in another $2.5 million program with Fresno County to study and replace a bridge damaged by land subsidence… The negative effects of land subsidence include the permanent loss of groundwater storage space and changes in elevation and the slope of streams, canals, and drains. Additionally, in some areas where groundwater levels have declined, surface streams lose flow to adjacent groundwater systems. These losses entail significant impacts to hydrology, as well as the biological systems that depend on those groundwater or surface flows. In addition, land subsidence can lead to cracks and fissures at the land surface, which may damage bridges, roads, railroads, storm drains, sanitary sewers, canals, levees, and private and public buildings. Furthermore, land subsidence leads to the failure of well casings, which will require additional well drilling and attendant environmental impacts to air quality… Reduced ability to replenish ground and surface water reserves also adversely impacts the ability of water purveyors to store water for dry years and emergencies. As just one example, reduced water storage can be expected to render southern and central California increasingly vulnerable to having insufficient supplies to suppress wildfires or sufficient supplies to survive a severe earthquake affecting conveyance facilities or other catastrophic events. Reduced exports of Delta waters also results in increased reliance by retail water users and their customers on other limited and lower quality supplies, such as recycled water, that need to be blended with SWP water to make them available for beneficial use…any impacts to the ability of the CVP and SWP to facilitate water transfers, including transfers of non-project water, should be addressed. For example, Reclamation must evaluate and disclose whether an alternative imposes additional operational constraints that limit (from no action conditions) the time or frequency when such transfers could be accomplished. Reduced SWP water supplies will result in increased reliance on Colorado River supplies, which are conveyed through Metropolitan Water District's Colorado River Aqueduct. However, Colorado River supplies have been limited to a basic apportionment of 550,000 acre-feet per year, and they are generally high in salinity (averaging 700 mg/L of total dissolved solids (compared to SWP concentrations that range from 200-300 mg/L)). Thus, blending of SWP water is needed to make use of Colorado River supplies.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Land Use, Including Agriculture - Reduced SWP and CVP deliveries will result in significant changes in land use, particularly in agricultural landscapes. As dramatically shown during the 2007-2010 period, reduced export water deliveries can and will increase fallowing of land across the Central Valley and elsewhere. Reduced water supplies can also cause shifts toward planting permanent crops that have diminished ongoing water requirements, but which also require watering year-in and year-out, thus diminishing future flexibility in water budgeting by precluding management options such as annual crop shifting or fallowing. Reduced supplies and lower quality water can also impact the production of certain crops, as well as the yield of crops that are grown. The unavailability of project water also increases the costs to obtain supplemental water. Lost exports also negatively impact water management plans that are produced by water agencies as source documents for evaluating land use projects. …in the SWP service area, it takes approximately 3 acre-feet of water per acre to sustain a crop for a growing season. In the CVP service area, it has been estimated that approximately 400 acres of land may remain out of production for every 1000 acre-feet of water lost… …In response to reduced surface water deliveries, farmers must increase their reliance on groundwater, which in many locations is an inferior water source due to its higher salinity. Unfortunately, not all fields and crops can be irrigated with groundwater, and the increased soil salinity from irrigating with saline groundwater impacts the ability to grow certain salinity intolerant crops in those areas. Because some crops are particularly sensitive to salinity concentrations, the use of high-salinity water may reduce the yields of these crops. … Impacts To Water Management Planning Related To Land Use - California law requires all urban water suppliers to prepare urban water management plans…The plans must identify and discuss factors affecting current and projected water supplies and demand, and they must identify steps being taken to ensure availability and reliability of supplies…development projects and land use planning decisions that depend on these plans will also be constrained by any future imported water supply reductions caused by the new BiOps.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Socioeconomics - Reduced Delta water supplies also cause socioeconomic impacts. In response to reduced water supplies, farmers fallow fields and this reduced agricultural productivity results in layoffs, reduced hours for agricultural employees, and increased unemployment in agricultural communities. Reduced agricultural productivity also has socioeconomic impacts for agriculture-dependent businesses and industries. In addition, unavailability of stable and sufficient water supplies reduces farmers' ability to obtain financing, which results in employment losses, due to the reduced acreage of crops that can be planted and the corresponding reduction in the amount of farm labor needed for that reduced acreage. Reduced water supplies and the resulting employment losses also cause cascading socioeconomic impacts in affected communities, including increased poverty, hunger, and crime, along with dislocation of families and reduced revenues for local governments and schools. In the urban sector, reduced supplies or increased supply uncertainty can cause water rates to increase as agencies seek to remedy supply shortfalls by implementing measures to reduce demand or augment supplies. Connection fees and other one-time costs for new developments may also increase and further retard economic development. …Farmers would be required to make up for any shortfall in imported water deliveries by purchasing supplemental water at drastically increased costs, if such supplemental water is even available… ..the 2009 delivery reduction that resulted from implementing FWS's 2008 BiOp's RPA resulted in a loss of 9,091 jobs in the San Joaquin Valley, relative to the year 2005, most likely as a result of reduced agricultural acreage under production…The removal of 250,000 acres from production translated into the loss of approximately 4,200 permanent agricultural worker positions, with even more jobs lost in adjunct businesses, such as packing, processing, and other related services…Unemployment resulting from water delivery reductions has led to hunger in the impacted San Joaquin Valley communities. For example, one food bank serving Fresno, Madera, and Kings Counties estimated in 2010 that 435,000 people in the area did not have a reliable source of food, that hunger in these communities would continue to increase, and that at least 42,000 people served by the food bank in October 2009 were employed in the farm industry before losing their jobs. Environmental Justice - Although the impacts from reduced water supplies will have significant impacts on people and farmland throughout the state, the hardest hit areas will be in predominantly poor and minority communities--especially in the Central Valley where employment losses and environmental effects will be the most prevalent. As a result, water export losses have the potential to disproportionately impact disadvantaged communities and persons.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Biological Resources, Including Fish, Wildlife, And Plant Species -…reduced Delta exports will impact biological resources dependent upon imported water from the CVP or SWP for their sustenance. Indeed, wetland and riparian areas across the state, including some national and local wildlife refuges, are maintained, in part, by imported water supplies from the CVP and SWP. The fallowing of fields in response to the reduced availability of CVP and SWP water supplies also increases the proliferation of weeds and other invasive species. Invasive species can harbor disease, choke out native species, adversely affect transportation corridors, and clog irrigation canals…the EIS will also have to assess the impacts or biological benefits, if any, to the listed species and other biota from the various alternatives evaluated…In evaluating and comparing these action alternatives, NEP A requires that Reclamation discuss the level of uncertainty and conflicting information in the data used to develop the impacts analyses… Lack Of Water For Wetlands And Species Outside The Delta - Although a biological opinion's purpose is to aid the recovery of listed species, if the expected new BiOps result in reduced project exports, there will also be a significant impact on other protected species, which impacts should be analyzed…For example, the northwestern portion of Kern County is home to 14,000 acres of flooded water habitat, including the Kern National Wildlife Refuge, where migratory birds, including protected and listed species, nest and feed during the fall and winter. An additional 11,000 acres of recharge ponds are located in the Kern River fan area, which provides seasonal habitat during recharge cycles. These complexes depend on the fall and winter delivery of imported surface water to provide for migratory bird habitat…Another example of protected and listed species that could be harmed is found within the boundaries of the Santa Clara Valley Water District-which receives water from both the SWP and CVP. Of the 163 miles of local streams used by Santa Clara for instream groundwater recharge, 129 miles are considered to be habitat for threatened or endangered species, including 32 species of plants, 50 species of wildlife, six amphibians, and three aquatic species listed as special status species under State or federal law. Local reservoirs, streams, and artificial recharge ponds provide habitat for 11 native species and 19 nonnative species of fish. Populations of protected steelhead trout are known to exist in Coyote Creek, Guadalupe River, Stevens Creek, and San Francisquito Creek and their tributaries. Santa Clara's average in-stream flow releases for groundwater recharge are normally about 104,000 acre-feet. Project export restrictions could reduce these flow releases, which in turn could significantly impact these species…. in the San Joaquin Valley, there are protected oak woodlands that serve as habitat for many other sensitive species. These woodlands and the species they support rely on groundwater and would be injured by further drops in groundwater levels due to increased pumping in response to a curtailment of imported water deliveries. Similar impacts would be felt on other protected species throughout the SWP and CVP service areas. These potential impacts to other listed species must be analyzed in the EIS. Beneficial Effects On The Listed Delta Species - The EIS must analyze both adverse and beneficial effects. Therefore, a discussion must also be included to show the beneficial effects of the action, if any, on the listed species. These statements must be objective, balanced, and substantiated with evidence.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Water Quality Reduced – [reduced] water supplies impact water quality by reducing water agencies' ability to blend lower quality water (e.g., from local groundwater or recycled water) with the higher quality Delta water, which is frequently needed to make the latter water sources beneficially usable. Increased pumping of local groundwater to offset export losses can adversely affect water quality by drawing poor quality or brackish water into higher quality groundwater basins. Increased reliance on groundwater for irrigation can also negatively impact the water quality of surface water streams due to the leachates present in the groundwater that becomes stream runoff. …Selenium levels are often high in runoff from farms due to concentrations found in the groundwater… …Because Colorado River water is highly saline, State Contractor member agencies that use Colorado River water, including Metropolitan, must blend that water with higher quality SWP water in order for the Colorado River water to be usable for drinking water uses or for water banking…If low salinity water is not available, membrane treatment must be used, which result in losses of up 15 percent of the water processed and increased costs. …Unless higher salinity water is treated or blended, it will affect agricultural use and degrade the quality of soils in their service areas. In addition, degradation of the water available for groundwater recharge could limit the use of local groundwater basins for storage due to the inability to meet basin plan water quality objectives established by the RWQCBs. Thus, when SWP supply water is inadequate to blend with more saline Colorado River water supplies, imported Colorado River water cannot be used to recharge groundwater basins without concern for compromising the water quality objectives of the groundwater basins. This would exacerbate the impacts to groundwater caused by any water curtailments required by the action. …Some Regional Water Quality Control Boards of the State of California (RWQCBs) have adopted water quality control plans for groundwater basins within their jurisdictions that include water quality objectives for maximum amounts of TDS. When inadequate amounts of high-quality SWP or CVP blend water are available to meet the water quality requirements of RWQCB orders for recycled water recharge, recycled water cannot be used for recharge and member agencies must consequently defer, or abandon, water recharge efforts. Loss of high quality water to blend with recycled water for recharge thus contributes to additional groundwater recharge losses and the growing overdraft of groundwater basins in Southern California and the San Joaquin Valley. Recycled water is also frequently used for landscape and agricultural irrigation, as well as industrial applications. However, such reuse becomes problematic at TDS concentrations of more than 1,000 mg/L. Some crops are also particularly sensitive to high TDS concentrations, and the use of high salinity recycled water may reduce the yields of these crops.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Air Quality - Reduced Delta water supply deliveries can adversely impact air quality because land fallowing generally results in increased dust and particulate emissions. Additionally, increased air emissions will occur because of the greater amount of energy that is needed for groundwater well pumps to lift water from a lower depth due to the greater reliance on and depletion of groundwater reserves associated with reduced availability of export water supplies. …In addition to addressing such impacts under NEPA, Reclamation and the other federal agencies involved here must comply with the federal Clean Air Act, 42 U.S.C. § 7401 et seq. Among other requirements, no federal agency is permitted to engage in an activity that does not conform to an implementation plan… …Emissions From Pumping Lift Increases - Increased reliance on groundwater reserves for water supplies also results in increased energy use due to increased pumping lift needed to access deeper groundwater… Soils, Geology, And Mineral Resources - Reduced Delta water supplies impact soils, geology, and mineral resources because increased groundwater use results in soil subsidence due to reduced groundwater replenishment. In turn, greater deposits of salts that negatively affect soil quality occur as a result of relying more heavily upon lower quality groundwater sources. In addition, reduced agricultural planting and increased fallowing leads to greater topsoil lost to erosion…The fallowing of land also leads to greater soil erosion from wind and water, which comprises an additional irretrievable resource loss. Such actions may result in substantial soil erosion and loss of topsoil. Visual, Scenic, Or Aesthetic Resources - Aesthetics are impacted by reduced water supplies because resulting socioeconomic impacts from lost agricultural employment will affect urban decay in regions affected by resulting employment losses. Lower reservoirs and water levels in the upper watersheds from restrictions that require reservoir releases, and barren and decaying farmland where planting and maintenance is infeasible due to the unavailability of delta water supplies, will have negative aesthetic impacts. Increased reliance on groundwater can also negatively impact aesthetic resources by causing damage to infrastructure from land subsidence.

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Global Climate Change, Transportation, And Recreation - Reduced water supplies from the Delta and increased reservoir releases to meet RPA requirements can also impact climate change due to the greater amount of energy and resulting emissions needed for pumping groundwater from greater depths, reductions in carbon uptake by plants, and changes in the timing and magnitude of project hydropower generation. …Land fallowing that results from failing to obtain sufficient water allocations to plant crops will also reduce the amount of carbon sequestration that would have otherwise occurred by planting crops, and would have thereby removed carbon dioxide and other greenhouse gases from the atmosphere… … Because of the operational changes to project reservoir releases, reservoir carryover, and Delta export pumping needed for meeting flow requirements, there is potential for drastic changes in the timing and magnitude of project hydropower generation. This impacts the availability and cost of clean electricity, and it also requires energy managers to rely on unclean sources of electricity… …Transportation can be impacted by greater impediments from blowing dust on fallowed lands, tumbleweeds, and bird-on-aircraft strikes… …Fallowing can also increase the incidence of bird-on-aircraft strikes, which impacts air transportation for both domestic and national security purposes. Fallowed fields are an excellent habitat for tumbleweeds (Russian thistle), which break from the soil and are transported with the wind. Proliferation of these species can hamper highways and canals, among other deleterious effects… …Recreation impacts are also likely to occur due to impacts on reservoir levels and upper watershed flows...
Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Comparison Among Alternatives – Because part of the purpose and need entails ESA compliance by operating the projects to avoid jeopardizing the species or adversely modifying their critical habitats, it is critical that the EIS at a minimum provide analyses and descriptions for the no action alternative and the various other alternatives of the estimated increase or decrease in: (1) the numbers of individuals of each species, (2) the estimated population viability of the listed species, and (3) the amount or quality of their critical habitats. This is not an exhaustive list, and Reclamation should determine if other biological metrics would also be useful and appropriate. Because maintaining the projects' water supply reliability is a key aspect of the purpose and need, Reclamation should provide a commensurate level of analysis and detail regarding the degree to which each alternative would impair the ability of the CVP and SWP to serve their water supply functions… Cumulative Impacts - …there are numerous other stressors currently affecting the listed species that are or may be having a cumulative effect on the species…The Public Water Agencies also encourage Reclamation to explore in the EIS whether any mitigation would address these other causes of cumulative effects, which could maintain or improve the conditions of any of the listed species so as to allow sustained and improved project operations for water supply reliability. Additionally, there are numerous actions that have recently been completed or are currently being implemented by private, local, state, and federal actors throughout the project area to improve the habitat and status of the listed species whose benefits to the species must be taken into account in all the alternatives. These actions include gravel augmentation to improve salmon spawning conditions, changes in the operations or physical character of diversions (better screens or ladders), and modifications to other structures to improve passage for salmonids and green sturgeon…

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Local Agency	Daniel G. Nelson, Terry L. Erlewine, and Thomas Birmingham, San Luis & Delta-Mendota Water Authority, State Water Contractors, Westlands Water District	Disclosure And Discussion Of Scientific Uncertainty And Data Gaps - Past regulatory decisions taken without the guiding light of NEP A have been made with an unjustified claim of certainty or necessity without acknowledgment of the significant uncertainty or imprecision that accompanied such actions…when Reclamation is evaluating the reasonably foreseeable significant adverse effects on the human environment in [the EIS] and there is incomplete or unavailable information, it is required to always make clear that such information is lacking. 40 C.F.R. § 1502.22…However, [e]very effort should be made to collect all information essential to a reasoned choice between alternatives. NEPA Handbook at 8-16. At a bare minimum, if the relevant incomplete information cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, Reclamation must include a statement in the EIS explaining the nature of such information, its relevance, a summary of existing credible scientific evidence, and Reclamation's evaluation of potential impacts based on approaches or methods generally accepted in the scientific community. 40 C.F.R. § 1502.22(b). In 2004, the National Research Council issued a report addressing the degree of scientific certainty, or lack thereof, regarding measures imposed under the ESA for the protection of listed fishes in the Klamath River basin. National Research Council, Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery. Washington, DC: The National Academies Press, 2004. To accomplish their charge, the committee developed specific conventions for judging the degree of scientific support for a proposal or hypothesis in the Klamath biological opinions. Id. at p. 35…If the federal agencies make a policy decision to apply the precautionary principle here, that choice should be explicit, so that the choice and the tradeoffs involved are made clear to the public and any reviewing courts. Information Quality Act - The Information Quality Act (Public Law 106-554) and orders, regulations, and guidelines issued thereunder impose additional requirements on Reclamation that must be applied to this NEPA process. Reclamation recently issued its peer review policy to implement the mandate in the Office of Management and Budget's Bulletin and Guidelines that important scientific information shall be peer reviewed by qualified specialists before being used to inform a government decision (IQA Policy). Reclamation's IQA Policy requires peer reviews of all scientific information that is determined to be influential scientific information or highly influential scientific assessments, The IQA Policy applies to NEPA documents…the Public Water Agencies urge Reclamation to be prepared to implement the IQA peer review policy.
Local Agency	Rebecca Akroyd, San Luis & Delta Mendota Water Authority and Westlands Water District	…we'd request… an additional scoping meeting somewhere in the West Side, San Joaquin Valley.
Local Agency	Martin McIntyre, San Luis Water District	When these biological opinions were implemented, the water supply, the federal water supply at San Luis Water District and other federal contractors was reduced almost 50 percent. There is absolutely no doubt that this water supply reduction had serious unmitigated human, social, and economic impacts…I'm concerned about the bias continuing to affect the process as we revisit these opinions… …When the National Marine Fisheries was preparing the biological opinion governing commercial fishing -- they found that fishermen could kill 10 to 25 percent of adult endangered salmon without jeopardizing the species… When the same agencies, the agency, the National Marine Fisheries Service prepared the biological opinion for the pumps ---- they found that any take by the pumps of more than one percent of the return in juvenile salmon would jeopardize the species. So I would ask, and my request tonight is, that during the preparation of these opinions that the responsible agencies reconcile the difference between these numbers, 25 percent taken on one hand, 1 percent taken on the other…

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Local Agency	Jeff Sutton, Tehama Colusa Canal Authority	…the RPAs as they exist in current biological opinions have dramatic impacts associated with reduction in water supply… the socioeconomic impacts that would be felt if the water was removed as a result of the implementation of RPAs, that would reduce the water supply. It was estimated about a billion dollars to a regional economy of 150,000 acre-service area. Sixteen thousand jobs associated to the lands were the loss of that. And the socioeconomic impacts that would be felt if the water was removed as a result of the implementation of RPAs, that would reduce the water supply. … if you remove that water supply the surface water supply folks are going to move to ground water. And with that you have a variety of impacts; overdraft, environmental impacts to creeks and subsidence and impacts that go along with the overdraft law. That's something that will impact other water users as well. And then have the ground water work themselves as well…those impacts and would also cause environmental and economic impacts… The environmental impacts of surface water you would have water in drains, impact the specific flyway impacts, impacts the terrestrial species, aquatic species by not being able to apply that surface water in the way we've seen the projects historically operate. And again with those impacts you also see recreational impacts and therefore economic impacts…Whatever comes out of coordinated biological opinion, the RPAs can't contradict each other…somewhere there's got to be a balancing act and some decisions made on that…
Local Agency	Tom Glover, Westlands Water District	…I would ask that you reschedule this meeting to a time and notice it properly. And also the location in Madera, I think there's other locations that would serve us much better: Los Banos, Mendota, Paris Ranch… We're concerned in Westlands because any time our surface water is cut, what that does is our farmers are more reliant on ground water. It accentuates the overdraft problem on the West Side. Also you can experience the greater air quality issues with the diesel generators…In wet years we utilize surface water and in drier years we pump groundwater and allow the [aquifer] to recharge during wet years and pump like sell during dry years when the water is needed. So part of the reason the canal went in in the first place is mitigation with subsidence on the West Side…but there is definite effects to our growers on the West Side. So the other area of concern is unpredictability of our allocation…So that is our growers, them knowing what their allocation is early in the season is very important so they can plan accordingly and plant and go to the bank for the funding for their planting. So when we get squeezed in the Delta there are direct affects on the allocation and the ground water pumping…I know you're going to get comments on the fishery issues, but this is really on the ground of what's happening. Look at the umemployment…Every acre that's fallowed, if the allocation isn't up, that means land is out of production…In Westlands…probably between 20 and 25 percent of our crops are permanent crops. So the growers can fallow land, but it's hard to make a mortgage payment off of fallowed land. So when we get cut, our growers get cut and land is out of production. And we've been looking at what the farm gate value is, and to use the number of about $1,500 an acre for the produce coming off of the fields. And if you looked at two-and-a-half times of the benefit to the region, that's about $4,500 an acre. And you multiply that in 2009 we had about -- I'm trying to remember what the number was -- 260,000 acres. So you multiply that and that's a lot of zeros that the economy has lost, the region has lost. And so when they're making cuts in the Delta, they're affecting lives on the West Side growers. To get back to my original comment, I really would like to see our growers be able to interact.

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Local Agency	Gayle Holman, Westlands Water District	So when I think about this and what we are 4 working towards here, this long term effect for 2016, the thing that comes to mind is the human impact of it, the economic impact. California is in a state of deficit spending, and here we have a tangible project where farming produces an enormous amount of revenue that comes to our state of California like no other industry. People won't stop eating. It's a given. It's going to sustain and it will continue. So we have growers year after year, generation after generation, continuing providing that. And maybe through the bumps in the roads they want to throw in the towel when they have the 10 percent allocation. But the bottom line is I ask you to look at the long-term human and economic impact and to see the tax revenues that these guys generate. And it's just astounding the things we take for granted. The unemployment is still very, very high in these communities. Yesterday I was out on the West Side…And I drove through San Joaquin at 7:30 in the morning and saw the Community Food Bank there setting up shop. And all the residence lined up waiting to receive their free handout of groceries because there are not enough jobs to go around.
Interested Party	Aubrey J.D. Bettencourt, California Water Alliance	…these biops and RPA's, they aren't just acronyms, that they have true human impacts and they have a face and you've seen them here today…as long as the environment is broken, government agencies will continue to regulate in an attempt to fix it, shutting another farm, another family, another fishing fleet, another American dream down…In the 21st century I refuse to believe that we cannot provide, we cannot develop a comprehensive solution which provides an equitable and reliable supply for agricultural, urban and environmental water users.
		Recommendation/Requests: Transparency with public & water users, comprehensive consideration of stressors on Delta ecosystem, earlier and accurate allocation announcements.
Interested Party	Pamela Sweeten, California Women for Ag and American Ag Women	Suffering economic losses, both farmers and vendors, due to lack of water, consulting companies, trucking companies, and fiber companies, and PCAC's, contractors, workers, land that was left with no need to purchase supplies from the suppliers. Other instrumental people lost their jobs as well. And without farmers generating sales tax, California is going to be in worse shape than ever…without farms, we have no food, no national security, and an issue also, air quality for our valley.
		Farmers and vendors suffered economic loss due to lack of water. Consulting companies, trucking, fiber companies, PCA, seed, contractors, and workers. Land left fallow, no need to purchase supplies. No farms – no food – farmers generate sales tax – national security issue – air quality.
Interested Party	Kelly Lilles, Catholic Charities in the Diocese of Fresno	As the Agency Administrator of Catholic Charities, I have great concern over decisions being made to protect the Delta Smelt and Salmon without regard of the impact it has on all the people in the Central Valley. The Agencies haven't considered what types of impact might occur each time they turn the pumping facilities off… I witness firsthand the need to have access to quality produce for our clients and the negative impact that would take place if our farmers don't have enough water to grow their crops. Our lines will increase around the building with folks who are out of work due to the restricted water supply and lack of jobs. Many of the people we serve are farm laborers and count on jobs in the Ag industry for work year round. Each time we see unemployment rise, we witness more domestic violence taking place in the homes of those who are under great financial stress to provide for their hungry families. When our clients don't have access to proper fruits and vegetables needed to sustain well balanced nutrition, we see a rise in health problems…43 percent of the clients we serve are under the age of 17 and have a difficult time staying in school when mom and dad need extra help with income. We see more graffiti and crime rise when people are unemployed and hungry for proper nutrition.

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Interested Party	Leah Zabel, Center for Environmental Science, Accuracy, & Reliability (CESAR)	The EIS must provide information acknowledging that California's water system is virtually wholly managed, that there is no longer a 'natural' flow regime, and that any preferred alternative is simply the result of a series of policy choices based on implicit water allocation priorities. This information must include: A description of the physical changes over the past 150 years that have resulted in the existing managed water system which supplies farms and cities throughout the state with fresh clean water. This information is necessary for the public to understand the consequences of these water allocation choices on the human environment…The EIS must provide information on the historical changes in California's water systems in order for the public to assess and comment on significant changes in OCAP and the appropriateness of the 'environmental baseline' chosen for the Section 7 consultation required by the ESA. This baseline is important as it forms the basis for evaluating the consequences of the 'agency action' for the purposes of the biological opinion which is the result of an ESA consultation. The biological opinion in large part defines the extent to which OCAP 'continued' operations are altered and water supplies reallocated. - An enumeration of the legal requirements that govern operation of the OCAP, from water delivery to flood control. In assessing the effects of the Bureau's proposed operation on listed species for the purposes of the ESA Section 7 consultation, only discretionary actions are considered. The Bureau must identify those actions which over which they have no discretion in order to ensure that they are properly included in the environmental 'baseline' for the purposes of a Section 7 consultation under the ESA. The NEPA document must provide this information so that the public and the consulting wildlife agencies have the benefit of the Bureau's interpretation of their own authorities in identifying which agency actions generate 'effects' for the purposes of the ESA. Some examples of requirements imposed on the Bureau which are not discretionary: Wildlife refuge contracts and exchange contracts; California's State Water Resources Control Board (SCWRB) orders which impose multiple constraints on the operations of the CVP and SWP; Water Rights Decisions; such as Decision1641which implements the objectives identified in the SWRCB 1995 Bay-Delta Water Quality Control Plan and protects beneficial uses in the Delta through the use of flow and water quality objectives. The distinctions between discretionary and non-discretionary actions are important because only those effects that are the result of the Bureau's discretionary actions generate any ESA 'effects' to listed species. All other actions are part of the ESA's 'environmental baseline' and are not considered 'effects of the action' under the ESA….The Bureau must provide information on those individual actions within the operation of the OCAP which they have distinguished as discretionary, as those actions create the 'effects' which concern the Section 7 consultation. Further, the Bureau must provide the public with the rationale for each determination that an action is discretionary, since the determination itself can result in significant NEPA environmental effects as a result of conditions in the biological opinion which are the result of identified discretionary actions…It is plausible that flexibility exists within a non-discretionary action. If the Bureau identifies such circumstance, the NEPA document must provide a clear explanation of whether and how such flexibility renders the entire action discretionary.

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Interested Party	Leah Zabel, Center for Environmental Science, Accuracy, & Reliability (CESAR)	The EIS must provide an explanation of the requirements of an ESA Section 7 consultation and the resulting biological opinion, in the context of the OCAP. This information is important as it enables the public to understand whether and how the FWS has met the legal and policy requirements for the requirements generated by the biological opinion that results from a Section 7 consultation…This analysis must take place within the same time frame for the entire biological opinion; there is no authority to vary timeframes based on the effect being analyzed. There are two reasons that a single time frame is essential, first, because it is the Agencies' own requirement for an analysis that complies with the requirements of the Act, and second, failure to use a single timeframe for the baseline could, as a practical matter, lead to conflicting or inconsistent requirements for environmental conditions that would be practically impossible to achieve…The regulations and the Act contemplate an analysis whereby incremental change is identified and analyzed, any other interpretation results in biological opinions which are retroactive and result in agencies being required to compensate for conditions for which they have no responsibility. …the Bureau must either comply with the existing published Guidelines or provide information to the public on how they determine what is 'best scientific and commercial data available' in assessing the validity of the OCAP BiOp…The Bureau may only accept those conservation conditions included in the Biological Opinion which are based on data and consistent with the transparency and peer review requirements of the OMB's IQA Guidelines which have been adopted by the Services. …the Bureau's NEPA examination must provide information demonstrating that: a. The conservation actions required by the OCAP biological opinion are based on data, and b. that the science and analysis used to support the BiOp conclusions data is consistent with the requirements of the OMB IQA guidelines. …the Bureau must provide the public information on how the BiOp conservation actions and RPAs are effective under PECE [USFWS Policy for Evaluating the Conservation Effectiveness] so that the public has access to the evaluations of the effectiveness of the RPAs and other conservation actions which will enable them to determine whether these actions are likely to be effective. …The conditions existing today are the effect of the imposition of regulatory controls that were not legal, but left in place in the absence of any alternative. This creates a practical problem whereby litigants have achieved de facto imposition of illegal conditions which has resulted in the significant reallocation of water supplies and catastrophic losses for the public. The EIS must provide information on: 1. How the Bureau intends to identify the environmental baseline for the EIS, will it be the environment as it existed at the time of the first consultation in 1995, or some other baseline, and if so what, and how will the Bureau account for changes to the environment which are the result of invalid biological opinions. 2. How the Bureau intends to define the environmental baseline for the purposes of the ESA Section 7 biological opinion. Does the Bureau intend to use the environmental baseline as it existed at the time of the first consultation, or some other baseline later in time, which is the result of the operation of an invalid biological opinion? Whatever baselines are chosen by the Bureau, sufficient information must be provided to the public in the EIS to allow informed comment on the baseline itself and the rationale for the choice.

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Interested Party	Leah Zabel, Center for Environmental Science, Accuracy, & Reliability (CESAR)	The EIS must provide the public with full information on what is known and unknown regarding the listed species…the EIS must at a minimum: 1. For each listed species, provide citations to the data supporting statements as to the status of the species; 2. For each listed species clearly distinguish which information on the species is supported directly by data, which information is based on hypothesis, and the supporting data, and which information is based on the 'best professional judgment' of wildlife agency staff or consultants 3. Provide information to the public regarding the concern that food supply, affected by ammonia deposition, is depressing delta smelt populations 4. Provide information to the public regarding the fact that no data supports an assumption that OCAP pumping is adversely affecting Delta Smelt long term abundance; 5. Provide information to the public regarding the fact that year-round flows are resulting in year-round salmon runs, and that distinct salmon runs are hybridizing; 6. The Bureau must provide information to the public regarding; a. New delta smelt populations discoveries; b. Knowledge of delta smelt spawning in the wild; c. The effect of spring inflows on delta smelt populations d. The effect of spring outflows on delta smelt populations e. Existing delta smelt life-cycle models. The EIS must develop a new biological assessment and may not rely on the 2008 Biological Assessment (BA) prepared by the Bureau as the 2008 BA…the Bureau's proposed use of the 2008 assessment for the EIS is inexcusable given the tremendous increase in scientific data and analysis in the ensuing 4 years, including but not limited to, availability of delta smelt life cycle models, new published research demonstrating the detrimental effects of ammonia deposition on delta smelt food supply, evidence that salmon runs are now almost constant, rather than seasonal, and the federal court's findings regarding the arbitrary and capricious nature of the science used by the government in the 2008 and 2009 Delta Smelt and Salmon BiOps.

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Interested Party	Leah Zabel, Center for Environmental Science, Accuracy, & Reliability (CESAR)	The EIS must at least consider the following alternatives: a. The 'no action' alternative which must be continued operations pursuant to the last valid biological opinion. b. An alternative which consists of complete cessation of all CVP operations and water management. …First the Bureau must consider a true 'no action' alternative, that is: operate to the conditions of the last valid biological opinion and its associated incidental take permit. Second, CESAR believes that the Bureau must consider an alternative that assumes no managed or coordinated operation of the dams in any form, this alternative would have the Bureau open the flood gates of the dams and allow the river to flow unimpeded. This alternative would most closely resemble 'natural flow' pattern. If the OCAP is operated consistent with the provisions in the last valid biological opinion, there can be no 'incremental change' as identified in the ESA Section 7 regulations. Operation consistent with the management regimes consistent with any of the invalidated biological opinions is a change from the legal operation. Thus, the 'no action' alternative, to continue operation with no change from the last valid biological opinion should result in no jeopardy or significant constraints in the biological opinion…. CESAR believes that it may not be possible to harmonize the requirements for the identified endangered species and continue to operate the federal CVP…If that is the case, it will not be possible to operate the projects in a manner consistent with their legal authorization, it will not be possible to generate sufficient revenue to maintain the projects and to continue operations, and in the case of biological opinions with competing demands, it may not be possible for Bureau of Reclamation employees to operate the projects in a manner and avoid personal liability for take under the ESA. In such a case, it may be that the gates at the dams must be left open and flows be allowed to pass through unimpeded. The public must be provided an opportunity to review and comment on the consequences of either of these two alternatives to the human environment as well as the flora and fauna affected by their operation.

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Interested Party	Leah Zabel, Center for Environmental Science, Accuracy, & Reliability (CESAR)	The EIS must provide information to the public demonstrating how the requirements of the Biological Opinion on the OCAP preferred alternative: a. Are supported by a Section 7 effects analyses using the best available data; b. Are the result of discretionary actions as defined by the Bureau; c. Are supported by an effects analysis consistent with the requirements of CFR 50 Section 402 et seq.; d. Are effective. …Unless the conservation actions identified in the biological opinion, including any reasonable and prudent alternatives to avoid jeopardy, meet the substantive requirements of the ESA the Bureau may not unilaterally incorporate them into their NEPA alternatives and cite them as a basis to override other legally binding limitations on their operational authority. The EIS must provide information to the public explaining how the provisions of any biological opinion adopted as part of the preferred alternative meets the substantive requirements of the ESA, it's implementing regulations and the agency's guidance. In assessing the effects of Alternatives under NEPA the EIS must include any requirements which are the result of a biological opinion….Water delivery to communities and farms are controlled by contractual agreements with some delivery flexibility. The Bureau of Reclamation has little authority to go outside those contractual boundaries and substitute other priorities….The real 'change in the environment' of this agency action to, 'continue to operate', are the conditions imposed by Biological Opinions to allow that continued operation. Typically, under NEPA, when an action agency proposes alternatives, the Services only analyze the effects of the preferred alternative. In the case of the OCAP, the proposed agency action is for the Bureau to continue to operate the project consistent with its contractual obligations. The actual effect of the project on the human environment flows not from the agency action, but from the consequence of changes to the contractual deliveries of water which result from the conditions contained in the Biological Opinions designed to conserve listed species…A full analysis and proper review of those effects under NEPA would provide an opportunity to avoid the errors made by the Services, provide the public an opportunity to review and comment on assumptions, data and analysis used in the ESA effects analysis, and assist the action agency, the state and other affected parties to identify potential alternatives… If the Bureau chooses an alternative that cedes operational control of the CVP to the wildlife agencies as was the case with the 2008 biological opinion, the EIS must identify the legal authority for such delegation to another federal agency…If the conditions imposed by the OCAP BiOp are supported by data and analysis, they can be articulated as a series of decision rules developed by the Services for implementation by the biologists and engineers of the Bureau. There is no reason for the Services to have any ongoing participation in the operation of the project. The Bureau will have identified their action, accepted the decision rule related to operation of the project articulated by the biological opinion and can move forward based on that rule until the Bureau makes a discretionary decision to change that action. However, if it is the Wildlife Agency position that only they and their biologists are able to discern the necessary actions based on their 'best professional judgment' and thus must be active participants in the operation of the projects, that is not a conservation action based on the best available data and thus does not meet the requirements of the ESA.

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Interested Party	Chris Hurd, Circle A Farms	…the water coming in through the delta, CVP water is applicable to federal and state contractors of over five million acres. My range is from almonds to pistachios. And when there is water available, we also have tomatoes and other crops...The hardship was apparent with all of us on the west side, the cities, the ranchers, the workers, the vendors. It is estimated that it was somewhere between a three and five billion dollar implication to everyone involved because of the Biops in '09…As farmers and our communities, we are now challenged as the world is going to go from eight to 12 billion people. We are being asked to feed the world. And if long-term investment for all of us involved with farming is to be made by agriculture, then direction, leadership and sustainability is job one. We need hard decisions made. This is not easy. And this is not just for 2009 and 2010…the biological opinions in their remand, must reflect the truth, exact science, and all stressors.
Interested Party	Allan Clark, Clark Bros. Farming	We were not able to plant 320 acres of cotton this year, even though it had been riped listed & ready to plant. A 40% water allotment required we not farm 25% of our land. That means 25% fewer employees, 25% less income, 25% less taxes, & 25% less for all related industries. We cannot continue to farm like this!
Interested Party	William D. Phillimore, Coalition for a Sustainable Delta	The preferred alternative, described in the Notice as the proposed action, is implementation of operational components of the 2008 USFWS and the 2009 NMFS Reasonable and Prudent Alternatives. 77 Fed. Reg. at 18,860. The Bureau explains that we will develop and consider a proposed action and a reasonable range of alternatives, including a No Action Alternative. Id.…In light of the federal government's unwavering adherence to a failed and indefensible set of RPAs to date, its identification of those RPAs as the preferred alternative at the outset of the NEPA process raises the specter that the process will be an exercise in form over substance designed to rationalize a decision already made by the federal bureaucracy behind closed doors. The preferred alternative is arbitrary and unlawful. - The Bureau is required to rigorously explore and objectively evaluate a range of reasonable alternatives. 40 C.F.R. § 1502.14. An alternative that is arbitrary or unlawful is per se unreasonable. Therefore, it is improper to include any such alternative among those under consideration. Here, the Bureau is proposing an alternative that includes implementation of RPAs held to be unlawful by the United States District Court for the Eastern District of California. The preferred alternative is based on misinterpretation or mischaracterization of data and analyses or reliance on data and analyses that are demonstrably improper. - …the preferred alternative should be disregarded because it includes components that are out of step with prevailing norms and practice in the fields of ecology, quantitative biology, and statistics.

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Interested Party	William D. Phillimore, Coalition for a Sustainable Delta	…the Fall X2 Action, which was included in the USFWS RPA is based on data and analysis drawn directly from a journal article by Feyrer et al. (2007) and from a then in-manuscript predecessor to an article subsequently published as Feyrer et al. (2011). Neither of the articles supports the Fall X2 Action, and both have significant shortcomings that fully compromise their application in water and ecosystem management…First, and of primary concern, is that the biological opinion recapitulates Feyrer et al.'s (2007) investigation of environmental correlates of delta smelt occupancy in the estuary, which was limited to just three physical variables; it ignored other physical variables that appear in the agency's own conceptual models that link delta smelt population responses to environmental attributes, and disregarded biotic variables, such as food availability and the presence of predators, altogether…Second, the biological opinion makes two fundamental analytical mistakes that contribute to mischaracterizing the relationship between the locations of X2 in the estuary to delta smelt abundance…Third, the characterization of delta smelt as preferentially inhabiting just a portion of the estuary's low-salinity zone is drawn at least in part from a mischaracterization of that distributional relationship as presented in Feyrer et al. (2007) and perpetuated in Feyrer et al. (2011)…Fourth, the biological opinion failed to relate explicitly the various adverse effects from environmental factors to population effects on delta smelt…Fifth, eschewing analysis of the effects of water exports on the demographic condition of delta smelt as required, the biological opinion adopts a habitat index (from Feyrer et al. 2011) that incorporated data generated by the above sampling shortcomings to make predictions regarding the availability of habitat under different flows scenarios…Any of the five technical errors above render the Fall X2 action not consistent with best available science as required by law. Furthermore, the flows-management prescription that is set forth as the Fall X2 Action is premised on an incorrect definition of delta smelt habitat and an inappropriate interpretation of habitat in the context of resource management…There simply is no evidence to support the link made in the USFWS biological opinion and RPA between the location of X2 in the estuary in the autumn, and either the extent (or quality) of delta smelt habitat or trend in population numbers of the fish. Another component of the preferred alternative that cannot be reconciled with prevailing norms and practice in the fields of ecology, quantitative biology, and statistics is implementation of the I:E Action…It is based on the Vernalis Adaptive Management Plan (or VAMP) studies. These studies involve the release and tracking of tagged hatchery fall-run Chinook salmon smolts during a 31-day period during April and May when a pulse flow of water was released at Vernalis. NMFS states that the VAMP studies provide support for the proposition that increasing flows increases survival of outmigrating salmon smolts. They then reason that wild steelhead would likely benefit in the same way as hatchery fall-run Chinook salmon. Flaws in NMFS's interpretation of the VAMP studies and other pertinent studies, a break in the logic chain that links its interpretation to the purpose of the I:E Action, and a fundamental flaw in the underlying VAMP studies that use acoustic tags all combine to compromise the conclusions drawn by NMFS. Continued adherence to the I:E Action is inconsistent with norms and practice in the fields of ecology, quantitative biology, and statistics.

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Interested Party	William D. Phillimore, Coalition for a Sustainable Delta	The purpose and need should not be to implement the operational components of the Services' respective RPAs, but to avoid jeopardy of listed species and destruction or adverse modification of critical habitat while supplying sufficient water to meet the agricultural, municipal, and industrial needs of millions of Californians in the CVP and SWP service areas…The underlying purpose of the Bureau's action is to continue to supply its share of the water needed by tens of millions of Californians and over 1.5 million hectares of irrigated agriculture in the CVP and SWP service areas without jeopardizing listed species or adversely modifying designated critical habitat. This underlying purpose and need is also consistent with the California Legislature's stated goal for the Delta, namely, to achieve the two coequal goals of providing a more reliable water supply for California and protect, restore, and enhance the Delta ecosystem. Public Resources Code § 29702; see also Water Code § 85001(c); id. § 85054... The Bureau must consider a reasonable range of potentially feasible alternatives, including alternatives outside the Bureau's control. - …The Coalition urges the Bureau to consider a broad range of feasible alternatives, commensurate in breadth with the broad purpose of the action discussed above, including alternatives that are not within the Bureau's jurisdiction. Although the Bureau has begun the scoping process, based on the NOI, it appears that the Bureau will not proceed in a manner consistent with the scoping requirements set forth in the NEPA regulations…First, in its Notice, the Bureau indicated its intent to invite the State and Federal Contractors Water Agency to participate as a cooperating agency, but it did not indicate an intent to invite the state and federal water contractors themselves despite the fact that they are affected local agencies.…not only do the contractors have a manifest and sustained commitment to improving the health of the Delta ecosystem, they have also developed considerable expertise on the Delta and Delta ecosystem over the decades, and especially in the last decade or more. Their expertise can assist the Bureau in identifying and analyzing feasible alternatives. In addition, the Coalition requests that the Bureau invite the Federal Emergency Management Agency (FEMA) to participate as a cooperating agency. Among other things, Executive Order 11988 requires federal agencies to take action to reduce the risk of flood loss, and restore the natural and beneficial values of floodplains. Moreover, FEMA's implementation of the National Flood Insurance Program in communities in the Delta may affect listed species and their designated critical habitat… Second, the Bureau should engage with the federal and state water contractors in developing the proposed action and alternatives… Third…At this time, the Bureau and the Department of Water Resources have re-initiated formal consultation with the Services under section 7 of the Endangered Species Act on the impacts of coordinated long-term operation of the CVP and SWP. In addition, the Bay Delta Conservation Plan (BDCP) and BDCP EIR/EIS are being developed, as are the Delta Plan and Delta Plan EIR/EIS. The State Water Resources Control Board is in the process of developing revisions to the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (2006 Bay-Delta Plan) and preparing a Supplemental Environmental Document to analyze the potentially significant impacts of the project under the California Environmental Quality Act. The NOI fails to mention these other consultations, plans, and environmental review documents despite their potential to inform scoping and subsequent environmental analysis of the Bureau's proposed action… Fourth, the Bureau has not [i]ndicate[d] the relationship between the timing of the preparation of environmental analyses and the agency's tentative planning and decisionmaking schedule. 40 C.F.R. § 1501.7(a)(7). Indeed, it has not published a schedule for the environmental review process or the Bureau's decisionmaking schedule.

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Interested Party	William D. Phillimore, Coalition for a Sustainable Delta	RPA alternative 1 - Includes the following measures. - Triggers for OMR reductions for delta smelt - San Joaquin River inflow requirement for salmon - Predation control program targeting black bass, striped bass, and pike minnows for salmon and delta smelt - Floodplain habitat restoration for salmon and delta smelt - Trap and haul program upstream of the Head of Old River Barrier for juvenile salmonids entering the Delta from the San Joaquin River - Work with Pacific Fisheries Management Council, CDFG and NMFS Southwest Fishery Science Center to minimize harvest mortality of natural origin Central Valley Chinook salmon RPA alternative 2 - Includes the following measures. - Floodplain development limits for salmon and delta smelt - Levee vegetation and armoring policy for salmon and delta smelt - Predation control program targeting black bass, striped bass, and pike minnows for salmon and delta smelt - Water quality improvement program at the Sacramento Regional Wastewater Treatment Plant and the Fairfield-Suisun Sewer District treatment plant for salmon and delta smelt - Floodplain habitat restoration for salmon and delta smelt - Trap and haul program upstream of the Head of Old River Barrier for juvenile salmonids entering the Delta from the San Joaquin River - Harvest restrictions for salmon I believed that our strategy should work and believed that our water should rise more than 10% - yes we should make polictial actions a strive to succeed in getting more water in the valley. And I agree 100% with the Bureau of Reclamation.
Interested Party	Joe DelBosque, Empresas Del Bosque	2009 is a year that is engraved in my mind and it's there because it should never happen again. The impacts were severe on our farm. On my farm alone, I idled over 900 acres of land, very productive land. On those 900 acres were losses that were huge, in farm gate prices, in the millions of dollars, and in food, food enough for millions of people in the country. But the worst effect of the drought – and the affects were terrible on our farms – but the effects were more severe on our farm workers. We saw people without jobs, we saw people who were working and they were under employed…There were other impacts in my area. We saw many people that lost jobs move away. These are people that are skilled at what they do, driving tractors, irrigating, harvesting. Many of these people didn't come back. We saw in my area, the little grammar school out in the country that I went to since I was in first grade, closed down for lack of enrollment… In the delta we have other stressors, we have invasive species. We have partially treated waste discharge into the delta that harm the ecosystem. We have unscreened pumps, over a thousand pumps in the delta with no screens pumping at will. And you can't tell me that there's no smelt or salmon that are swimming by those pumps… We have to look at the infrastructure. We have a system that was made in the 50's and 60's and this system is not keeping up with the state. The state is probably twice the size and population and it is grown tremendously. And if we don't catch up with our infrastructure, the state is going to be headed for disaster. So I urge the people at Bureau of Reclamation to remember about some of these impacts that we had in 2009 and that we plan for the future so this never happens again.

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Interested Party	Dayatra Latin, Fresno Community Food Bank	The end of July 2009 … We held our first drought distribution providing food to over 680 families in the city of Mendota. At that point, Community Food Bank had distributed about seven and a half million pounds of food every year. After everything is said and done, Community Food Bank was distributing thirty million pounds in food… We really need to fix that because in this country, it shouldn't be that way. We served thousands of people affected by this decision.
Interested Party	Ryan Jacobsen, Fresno County Farm Bureau	…San Joaquin Valley (SJV) farmers are faced with severe water restrictions that provide a 2012 water allotment of just 40 percent from the CVP. This decision has tremendous economic repercussions locally, as well as throughout the state and nation…It is estimated by water contractors that in just a six week period this spring, restrictions on CVP operations under the Endangered Species Act (ESA) cost south of the delta water users more than 180,000 acre-feet of water. This is enough water to irrigate 72,000 additional acres via increasing the allocation to 55 percent. In a county that still faces 15.8 percent unemployment, that additional water means additional jobs. Fresno County's 1.63 million acres of fertile farmland produces over 400 different types of crops which contributed more than $5 .9 billion to the California economy in 2010 and supports 24.2 percent of all jobs in the area. Fresno County agricultural products are exported to 94 different countries around the world. Therefore, the BOs that produce CVP operational restrictions when the Reasonable and Prudent Alternatives (RP A's) are implemented result in impacts that are felt well beyond the agricultural industry and The SJV region. According to the Berkeley Economic Consulting group's 2009 study, the initial Delta Smelt pumping constraints would have a $500 million to $3 billion annual impact on the California economy, depending on hydrological conditions. In 2008, when a 40 percent water allocation was implemented, there was a 65 percent full-time decrease in on farm employment and hundreds of thousands of acres were not farmed. Also in 2009, a UC Davis report estimated 80,000 jobs were lost, over 350,000 acres were left fallow and there was a loss of $2.2 billion in farm revenue as impacts were felt from the smelt BO alone. West side unemployment soared over that of the urban core. For many of those who work to harvest our food, the food lines became a staple during this period. These individuals were unable to work because the land lay fallow; they were unable to afford the produce that they would have normally been harvesting. Demand for social services increased while the cities and counties struggled to serve the residents due to the increased economic strain. The effects of this year's 40 percent CVP water allotment are just beginning to become apparent. Preliminary estimates are that 85,000 acres have been left fallow. A continued lack of surface water deliveries due to restrictions places a tremendous strain on our already depleted ground water. A reliable surface water supply is the only way that we can begin to systematically replenish our groundwater. There have been environmental impacts as well, as non-irrigated fields lay fallow. These open fields can often produce dust, negatively impacting the air quality in our region. Non-cultivated fields can also produce non-native plant species and noxious weeds that can have further economic impacts as additional work must be done to eradicate them.

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Interested Party	Ryan Jacobsen, Fresno County Farm Bureau	These BOs have resulted in a tremendous amount of human and economic impact without a correlating improvement in species numbers due to operational restrictions. Scientists who have studied the Delta agree that there are numerous factors contributing to the fisheries' decline. In a recently released Public Policy Institute of California (PPIC) study entitled, Aquatic Ecosystem Stressors in the Sacramento-San Joaquin Delta, flow regime change was identified as only one of five broad categories of stressors. PPIC concluded ... maintaining the status quo appears to be the least likely avenue to successfully managing the Delta's native biodiversity. Yet, the federal agencies responsible for drafting the BOs that impact Delta pumping operations have failed to quantify or analyze these stressors. The EIS must analyze all of these stressors because it is clear that the status quo management strategy of simply curtailing water pumping has failed urban and rural water users, as well as the environment.
Interested Party	Rodolfo Villa C, Hall Management Corporation	Antes que nada gracias por hacer esto por todos. Sin agua no tendríamos ninguna posibilidad de sobrevivir y ya se comprobó en el 2009 cuando más de la mitad de nosotros perdió su trabajo.
Interested Party	Mike Stearns, Hammonds Ranch	Hammonds Ranch is a third generation family farm. Farming for more than 90 years, land which is now served by the Panoche Water District and the Firebaugh Canal Water District. For the past 20 years we have seen our farm decrease in size by more than 50% and in turn, labor, equipment and materials, all of which are having a negative effect on our area. This is primarily due to the reduced water supply from regulation of the Delta and the way CVPIA has been implemented. What really hurts is now we are primarily drip irrigated (90%,+) on the land we are farming and fallowing 10% or more, depending on the annual water allocation and having a heck of a time making these investments pay. These investments in irrigation efficiency are paid through loan commitments and due to the way the delta is being regulated we have such wide variations in the water allocation plus not knowing what the allocation may be until late in year, we are not able live up to the commitments banks require. In addition, planning, contracting and planting of annual crops is impossible if you don't know if and when you have water. As chairman of the San Luis Delta Mendota Water Authority and a director for Panoche Water District and Firebaugh Canal Water District, I am convinced that beginning with this Remanded Biological Opinion process, the Bureau bas a real opportunity to provide the necessary leadership to assure that the BO is based on sound facts and science and that at the same time all stressors on the delta will be addressed with equal effort. Without that leadership we will be bogged in law suits and our efforts to improve the economy, including water transfers which result from the irrigation efficiency investments, will be killed, to the detriment of agriculture, M & I AND the environment.
Interested Party	Luis A. Monad, Harris Farms, Inc	Central Valley is the heart of California. We all depend upon agriculture either in the city or at the fields. We need more water to grow California.

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Interested Party	Katherine S. Poole, Gary Bobker, Mark Rockwell, Jason Flanders, John Mertz, Zeke Grader, Jonas Minton, Gary Mulcahy, and Jim Metropulos, Natural Resource Defense Council, The Bay Institute, Northern California Council Federation of Fly Fishers, San Francisco Baykeeper, Pacific Coast Federation of Fishermen's Association, Planning and Conservation League, Winnemem Wintu Tribe, Sierra Club California, Sacramento River Preservation Trust	…the most reliable and lasting approach to reducing conflicts between CVP/SWP operations and listed species is to recover those species (as all federal agencies are obligated to do under § 7(a)(1) of the ESA) and operate the CVP/SWP in a manner that is fully compatible with long-term ecosystem health. We believe such operations are entirely feasible, and should be the focus of Reclamation's NEPA review. I. Both The Proposed Action and Baseline Should Incorporate the Existing BiOps and RPAs - We agree that the Reasonable and Prudent Alternatives (RPAs) in the 2008 delta smelt and 2009 salmonid biological opinions (BiOps) provide the appropriate starting place for the CVP/SWP operations that define the proposed action. This approach is consistent with the district court's rulings, which directed Reclamation to conduct NEPA review on its decision to implement the RPAs. However, it is also important to recognize that those RPAs are currently being implemented, have been in place for over three years, and will remain in place at least until the pending NEPA review and BiOp remand is complete. CVP/SWP operations according to the RPAs, therefore, also represent the baseline operations for analysis under NEPA. II. Reclamation Should Define the Project Purpose Expansively and Consider a Wide Range of Alternatives - A. The 2008 Biological Assessment and Contractual Obligations Should Not Limit the Reasonable Range of Alternatives - …Reclamation's NOI describes the purpose of the action as continuing the coordinated operations of the CVP and SWP as described in the 2008 Biological Assessment (as modified) in a manner that avoids jeopardy and adverse habitat modification of listed species and is consistent with law and other requirements, including contractual obligations. …To the extent that Reclamation views either the 2008 Biological Assessment or contractual obligations as limiting the range of reasonable alternatives, we urge you to omit these qualifiers from the project purpose. The 2008 Biological Assessment describes only one of several possible ways of operating the CVP and SWP in a coordinated manner and in compliance with legal and other obligations. Moreover, the operations described in the 2008 Biological Assessment would indisputably lead to jeopardy and adverse modification of critical habitat for numerous listed species, conflicting with one of the primary purposes of the project as described in the NOI…Because numerous alternatives exist to operating the CVP and SWP as described in the 2008 Biological Assessment – alternatives that better meet the objectives of avoiding jeopardy and adverse habitat modification – Reclamation should not limit the range of alternatives analyzed under NEPA to those that comply with the 2008 Biological Assessment. …Reclamation and DWR have signed long-term water delivery contracts for the CVP and SWP that far exceed the capacity of the Projects to meet on a regular basis, let alone in an environmentally sustainable manner. Full contract deliveries for both Projects have rarely, if ever, been made, and are based on invalid build-out assumptions, outdated land use assumptions, and extremely favorable hydrology that occurs only very infrequently. Contract quantities are, therefore, unrealistic, and should not limit the range of reasonable alternative operating regimes…In addition, contract obligations do not trump Reclamation's duties to conserve threatened and endangered species and their critical habitats under the Endangered Species Act…Meeting contract quantity amounts is, therefore, neither a reasonable nor a legally-required objective.

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Interested Party	Katherine S. Poole, Gary Bobker, Mark Rockwell, Jason Flanders, John Mertz, Zeke Grader, Jonas Minton, Gary Mulcahy, and Jim Metropulos, Natural Resource Defense Council, The Bay Institute, Northern California Council Federation of Fly Fishers, San Francisco Baykeeper, Pacific Coast Federation of Fishermen's Association, Planning and Conservation League, Winnemem Wintu Tribe, Sierra Club California, Sacramento River Preservation Trust	Alternatives Should Consider Reclamation's Non-ESA Environmental Obligations and Alternative Water Supplies - 1. Alternatives Should Include Measures to Meet State and Federal Salmon Doubling Mandates - Numerous non-ESA environmental obligations apply to Reclamation that should cause it to modify Project operations in a manner that is more protective of the environment than the baseline RPAs. Reclamation's Development of Alternatives and Impacts Analysis Should Consider the Availability of Existing and New Alternative Water Supplies - …Reclamation and DWR have numerous non-ESA environmental obligations that likely exceed the effect of RPA compliance on water supplies if properly implemented, including salmon doubling obligations, public trust requirements, California ESA obligations, Fish and Game Code § 5937 requirements to keep fish in good condition below dams, and more. While California needs to maintain an adequate water supply to meet the needs of a growing population and economy, water delivered from the CVP and SWP is a small portion of the total water supplies both used by and available to the State, and cannot and should not be viewed in isolation from other supplies available to meet the State's water supply needs and CVP/SWP contractors' water supply needs. We urge Reclamation to take a far more holistic view of the State's available and potential water supplies when considering alternative operational scenarios and assessing water supply impacts…this document should include an analysis of the significant progress made in recent years by water users south of the Delta in reducing reliance on the Delta and increasing water use efficiency. This progress has been seen in both the agricultural and urban sectors … Reclamation should also analyze the additional benefits of investments to reduce reliance on the Delta, including reduced energy use and greenhouse gas emissions. Finally, Reclamation's analysis must reflect the state policy, established in SB 7X1 and codified at Water Code § 85021 to reduce reliance on Delta water supplies… This state policy requires Reclamation to change its traditional focus on maximizing water deliveries and focus instead on a broader set of tools that have the potential to reduce reliance on CVP and SWP deliveries… In summary, Reclamation can and should analyze ways to increase water supplies to its contractors through a variety of these investments in its alternatives analysis. Reclamation should also consider these and other supplies available to its contractors when analyzing impacts, as investments by the contractors and their member agencies can and should allow the contractors to better meet water needs in a way that is fully compatible with reduced exports under the BiOps.

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Interested Party	Katherine S. Poole, Gary Bobker, Mark Rockwell, Jason Flanders, John Mertz, Zeke Grader, Jonas Minton, Gary Mulcahy, and Jim Metropulos, Natural Resource Defense Council, The Bay Institute, Northern California Council Federation of Fly Fishers, San Francisco Baykeeper, Pacific Coast Federation of Fishermen's Association, Planning and Conservation League, Winnemem Wintu Tribe, Sierra Club California, Sacramento River Preservation Trust	…we urge Reclamation to consider in formulating alternatives and conducting its NEPA review, based on scientific information revealed after the BiOps were finalized and on experience in implementing the BiOps: 1. Revise the winter run Chinook salmon JPE calculation to reflect the best available science, including corrections for overestimation of in-river survival to the Delta in light of the results of acoustic tagging studies by MacFarlane and others since 2008. 2. Improve the first flush trigger to reflect when delta smelt begin upstream migration to spawn. 3. Make seasonal Old and Middle River flow requirements more restrictive to further reduce entrainment of early spawning larval and juvenile delta smelt, consistent with Bennett 2008. 4. Fully analyze and reduce impacts of CVP and SWP operations on primary productivity and food supply for delta smelt and salmonids, including effects of reduced spring outflow, exports, barrier operations, and changes in residence time, consistent with Jassby & Cloern 2000, Kimmerer 2009, and SWRCB 2010. 5. Increase San Joaquin River inflow to reflect SWRCB flow requirements, post-VAMP D-1641 requirements, and the recent testimony of the Department of Fish and Game and others. 6. Consider necessary protections for longfin smelt, particularly increased spring Delta outflow, should the species be listed under the ESA by the Fish and Wildlife Service during the period of remand.
Interested Party	David J. Guy, Northern California Water Association	NCWA previously submitted to Reclamation the enclosed May 19, 2011 and December 16, 2011 letters [Attachment 1] with their respective enclosures, for consideration and use in the Endangered Species Act (ESA) consultations for the remanded BiOps, and Reclamation's accompanying environmental impact analysis being conducted under the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.)…evidence of the problems and potential solutions regarding Sacramento River Basin native anadromous fishery issues, and will be critical in Reclamation's consultations on the potential effects of the proposed project operations of the CVP and SWP on listed species, including both salmonids and delta smelt, and the environmental impacts that must be addressed in the EIS. …the enclosed December 16 letter and its enclosure (Attachment 2…) …analysis enclosed with the letter utilizes a longer-term hydrologic period of record, and is superior to the analyses … which used a truncated period of record and ignored the plain fact that the 1956-87 period was wetter than the subsequent period from 1988-2009.3 Reclamation's analysis of the potential impacts of the remanded BiOps, and Reclamation's development of any flow management actions or alternatives must be based on the full datasets…Reclamation must consider and evaluate the…analysis that there is no relationship between diversions in the Sacramento River basin and the Delta smelt index. Finally, Reclamation must consider and evaluate the finding …that the implementation of a fall X2 measure as part of the remanded BiOps would have the effect of severely reducing carryover storage at Shasta Reservoir, with the consequent adverse effects on salmonids in the Sacramento River, as well as water supplies.

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		NCWA is also submitting herewith the enclosed April 25, 2012 scoping comments, and certain exhibits thereto (Attachment 4 hereto), which the Sacramento Valley Water Users filed with the SWRCB for the proposed update to the SWRCB's Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan). To the extent that Reclamation, FWS, or NMFS are considering flow management actions or alternatives in the remanded BiOps based upon some percentage of unimpaired flows, Reclamation must consider and evaluate the information included in that scoping comment letter and its exhibits. In this regard, the information demonstrates that flow management actions based on 40% or 50% of unimpaired flows would cause severe hydrologic, environmental, and water supply impacts, and would require Reclamation to analyze in detail the many significant environmental impacts that would occur in numerous resource categories. The information also demonstrates that state-of-the-art streamflow requirements already govern the major rivers in the Sacramento Valley. Because these streamflow requirements have been developed largely to integrate fishery protection and water supplies, NEPA requires Reclamation to analyze reasonable alternative flow management actions based upon the Delta inflows produced by existing streamflow requirements for the Sacramento Valley's rivers. …to the extent the remanded BiOps include any measures or Reasonable and Prudent Alternatives that could potentially affect the management of water resources in the Sacramento Valley, we note that ESA section 2(c) states congressional policy that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species, and therefore requires Reclamation to cooperate with local Sacramento Valley water agencies in the management of water resources in this region.
Interested Party	Marisela Rodriguez, Rodriguez Familia Ranch	Pienso que todo este programa de pedir agua para nuestra comunidad es un bién para todos tanto para los Rancheros como para nuestras familias.
Interested Party	Melissa Cushman, State Water Contractors	… the State Water Project and the users of that water are interested in there being sufficient water supplies for the tens of millions of users out by the Delta who are relying on that water. And the adequate protection of listed species is of course, also a consideration…We would like to participate as a cooperating agency… …we really think it's important to look at a wide variety of different measures to see the best way so that the species can be protected, plus the water costs kept to a minimum and to see what's most effective…What should be focused on is what is sufficiently protective of the species and allows for sufficient amounts of water supplies be available to the people who use Delta water…The possibilities are, you know, there would be OMR restrictions --OMR, old and middle river flow restrictions, that were part of the previous RPAs. And one of the suggestions will probably be to look at intermediary flow restrictions… Another possibility would be turbidity-linked measures. I know some of the evidence that was put forth in the trial court was that turbidity has a large effect on certain of the species, particularly the Delta smelt, and whether an alternative that is more geared towards turbidity rather than flow regimes might be equally protective or more protective, but have lower water costs because it would be more responsive to the… exact situation of what's going on and what has the most effect on the species, particularly the Delta smelt… The head of old river barrier as far as the salmon go… There's also mitigation measures…And a lot of the mitigation measures will probably have nothing to do with flow regimes or the operation of the projects themselves, but have the possibility of incorporating almost unrelated actions that could actually benefit the fish more than a particular flow regime could. Potentially. Such as controlling predators, controlling invasive food source… Reducing toxic chemical concentrations, restoring wetlands; that, of course, was part of the previous BiOp. Also, regulating smaller water diversions. Measures like that may be able to be imposed that can have a less significant impact on water supplies, but hopefully be very beneficial…

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Interested Party	Melissa Cushman, State Water Contractors	…Another important consideration in the NEPA process is the big concern of our clients is the fact that implementing, especially the flow-control measures, the X2 action, which is part of the previous BiOp as well -- one BiOp as well, and some of the other actions in the RPAs, won't just reduce the available water supply…Evidence was put forth in the trial court and the judge issued findings that water supply restrictions have a domino effect…increasing demand on local water supplies, especially groundwater, particularly in the Central Valley, which is already in severe overdraft. And severe overdraft leads to subsidence and other environmental, you know, disasters sometimes…Water quality impacts can happen because the Delta water is, as you know, very high-quality and it's used for blending with a lot of local resources and other surface water resources, including even Colorado River water and other ones like that. And this blending makes it able to be high enough quality that it can be used for a much wider number of beneficial uses. And once the high-quality water is cut back, suddenly there's a problem where you have – you can't do groundwater recharge in certain areas because the water isn't high enough quality to be able to meet the requirements of some of the regional water quality control boards. There also may be to be a limited ability to respond to emergencies, especially wildfires in certain circumstances. Agricultural land being taken out of production, I think that was the one that the District Court ended up focusing on. There's fallowing, loss of topsoil, due to erosion, air quality impacts that can result from fallowing. There's also environmental justice and socioeconomic impacts, also had a lot of testimony in the court about those…There's a loss of other farm-related jobs… water supplies reductions result in visual impacts, both urban decay resulting from economic problems, as well as just how unattractive fallowed land and dead crops are…outside of Delta water users also have a huge, huge impact to them, both direct and indirect environmental impacts from changing the amount of water that's available in particular types of years…
Interested Party	Justin Dutra, Stone Land Company	I am writing you as an employee of a diversified family farming operation. Stone Land Company was founded in 1948 by Jack G. Stone, employed just over four people and farmed approximately 640 acres. Today Stone Land Company employs approximately 60 full time employees and over an additional 200 seasonally. This is over 260 families that are counting on my employer to remain viable. Indirectly, there are countless business's that depend on these employees' dollars as well as our own: Grocery stores, Chemical/Fertilizer distributors as well as equipment dealers are all dependant on the business that we create: our annual payroll and crop expenditures are staggering. My question to you is what happens when this goes away? The loss of jobs and business's would be devastating to our already crippled economy and the main problem is once this great agricultural infrastructure is gone, it cannot come back. Currently we are investing heavily in water saving irrigation systems and the development of new wells to continue farming in this disastrous regulatory water drought we are encountering. This is not a sustainable solution but a temporary fix. Farming is not only a business but it is a way of life for us: we as well as our neighboring farms provide under the most heavily regulated environment in the world; the safest most abundant supply of food and fiber available anywhere! In order to maintain this safe food supply we must have a reliable water supply. We do not want to become a country that depends on foreign importation of food and this is exactly the road we are taking if we do not repair California's broken water system. I urge you to consider the human affect, consider the economy and consider the lives you are affecting with your decisions.

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Interested Party	Brad Craven, Superior Almond Hauling	…the community of post-harvest process is a very large group of employers. So a lot of the agricultural jobs come through our sector…On the environmental side, I just wanted to point out that farmers and processors like ourselves alike are required by the Air Pollution Control District to have conservation management plans. And conservation management plans for the most part deal with fugitive dust generation, PM10 control based on truck traffic or tractor operations… I think those plans are marginally affective in controlling the PM10 from fugitive dust. But I think it pales in comparison to fallowed lands and wind generator dust. And if you see the West Side winds in action whenever there's dry, untilled dirt, you can probably make a correlation between the frequency of traffic accidents caused by dust on the freeway and in the years that we have low water supplies. So I think the Air Pollution Control District probably doesn't have any good options in coming up with a system to control wind-generated dust in an area like that. Probably the best control would be to have a reliable and consistent water supply to make those lands productive and put a covered crop on them.
Interested Party	David Tolmachoff, Tolmachoff Farms	Reclamation makes its decisions of allocations after closed door meetings with Bay Area elites? EIS do they take include nitrates and pharmaceuticals in the Bay Delta city sphere of waste water for cities in consideration Does XXXX [waste]water from the Delta-Bay kill Fry Baby Fish? Do predator fish actually eat 90% of the schmelt-salmon? Why don't they tell people in Bay Area – it's partly their fault?
Interested Party	Piedad Ayala, Water 4 All	The problem that we have is that we, the farming industry, is getting blamed for what they are doing up north in Sacramento, Tracy and Stockton area. They're dumping all the sewage into the delta and then blaming the farming industry. The reality is, they need water to keep flushing all the problems they create up north…A lot of farmers have lost everything and with them we, as farm workers, have lost everything too because without farming, there's nothing here in this valley… Last year we have 180 percent rain, normal rainfall. We only received 80 percent. In a normal year like that we should be expecting at least what we pay for, 100 percent. We paid 100 percent for our water, in which we only receive 40 percent this year. 2009, everybody is talking about it, we got 0 percent.
		There have been countless meetings, but what ought to take place is some real action. We need to quit blaming the farmers, the fish, and the pumps. The underlying, and TRUE factor is the sewage that is being dumped in northern California.
Interested Party	Gracy Villavazo, Water 4 All	…slide show March 2012 as the initiating date of the scoping efforts and a concluding date was given of April 2016… That seems like an awfully long period of time to go out in search for reasonable alternatives when the answer is here today… Water means jobs… Water means lives. Water means our opportunity to grow and to better this economy in this crisis that we're facing today.
		I've come today to better educate myself on this issue and to question the wrongfulness in the shortage of water supplies imposed on our farmers across the state. Nowhere in the slideshow did I see the word People. Yes, lets save the Delta smelt but when did people fall second to these in importance?
Interested Party	Alonzo Garcia, Westside Harvesting	Sin el agua no se puede vivir la vida es mala, la economia, la salud los niños carecen de la nesesario. El agua es vida
Interested Party	David Aguilar, Westside Harvesting	Agua es vida, y una gran nesesidad para la comunidad entera, que sin ella no tendriamos trabajo, no mas plantaciones en todo el valle de San Joaquin. Sin el agua no habrá trabajo con que mantener nuestra familias, y proveerles alimentos, y el impacto sería fatal en todo el valle de San Joaquin.

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Interested Party	Jose T. Torrer, Westside Harvesting	Agua es vida y una gran necesida para toda. Una comunida entera y trabajo para todos. Los campesinos mejorar y no haya sed.
Interested Party	Baltazar Rodriguez, Westside Harvesting	En el 2009 la crisis estuvo muy critica, sin trabajo todo se combierte es un desastre. Lo único que se hacer es trabajar en el campo. Sin agua no se puede sembrar.
Individual	Todd Allen, Farmer near Firebaugh, California	…I am a third generation grower with farmland located close to Firebaugh, CA. I own 300 acres and lease 300 acres from my father within the Westlands water district. My father purchased the prime land in 1975 because he saw a great future for his family. He did very well and so did his employees. I farm crops such as cotton, wheat and cantaloupes. In December 2008, I planted 225 acres of wheat and was intending on planting 225 acres of pima cotton and 150 acres of cantaloupes. With the water I had left over from the year before, I was only able to irrigate 40 acres of wheat out of the 225 acres I had planted. The other 175 acres of wheat I had planted wilted up and died due to the fact that my initial allocation was zero. I have no wells on the farm and have to rely solely on Federal surface water to survive so I had to also fallow the remaining 450 acres. This created hardships for me that I thought I would never have to face, and was shocked that a 2 inch fish (Delta Smelt) was standing in the way of my success or failure as a farmer. The first thing I had to do was to lay off my employees which is a hard thing to do. Some of my employees have been working this land for 20 years or more. I then had to talk to the bank whom which I owed a substantial amount of operating money, they worked with me for a while then dropped me later on in the year. My suppliers suffered because they didn`t sell me the seed, fertilizer, pesticide, fuel and ranch supplies which amounts to thousands of dollars. I also experienced health problems due to the stress of whether I would be able to be able to take care of my beautiful daughters and wife. Had to start taking medication for high blood pressure. I also had to sell my water allocation that came to me in April (What am I gonna do with 10%?) to help pay for my land payment, home mortgage, and basic needs for my family. I luckily had my crops insured and used the indemnity to pay off my bank at the time in July, but because of the unstable water situation they told me no in November for 2010-11 crop year. I usually have operating funds for October! So I put together a package and visited 5 banks in a week and actually found a bank that wanted to take care of my operation. I still needed cash flow, so I sold my Cotton Picker, which was a painful decision, especially since I recently did a $15000 dollar overhaul on it. That got me through November and luckily was funded in December through my new bank. All this for an insignificant non-native 2 inch worthless fish. I tell this story to friends and family and they are thoroughly shocked that a little fish stands in the way of food and fiber for human beings and almost put me out of business. I really think that water diversions are not solving these fish problems. I`m convinced that its all political and a few people are benefiting from a feel good fish tale while thousands, if not millions are suffering financial or literally starving from this insanity!

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Individual	Mark and Mary Fickett, Farmers near Firebaugh, California	Our family farms almonds, pomegranates, and a variety of row crops, Our land Is situated in an area where there Is no ground water to pursue by drilling wells. We are 100% reliant on the federal CVP system to supply all of our irrigation water. In order for our business to survive we need a predictable and reliable water supply. Since the implementation of the endangered species act we have experienced unbelievable hardships. In 2009 we started our farming year with a 0% supply which caused all kinds of hardships for us. We were forced to lay off employees, who ended up In food lines in Mendota and Firebaugh. Our crop financing was completely cutoff for that crop year by the company who had been financing our crops up to that point. We were forced to see more costly financing to survive. We had no row crops that year and we had to shake the almonds that did set to the found where they were shredded up in order to qualify for a small crop Insurance payment. Later In the year we received a 10% supply which only allowed us to keep our trees alive albeit in poor condition. We are currently refinancing some of our land which is proving very difficult since we cannot produce any dependable water supply Information. We need to know an approximate range of water we will be receiving From year to year, We also need to know what the district's allocation will be before April or May of any given year because we plan what crops we are going to plant in September or October of the previous year. When we plan our cropping pattern in the fall we are also preparing financing and contracting for various input like fuel, fertilizer, labor, and chemicals. Some of these inputs must be paid for at this time when we have no Idea what the Bureau of Reclamation is going to declare at the allocation. We and our entire community are reliant on the water that's pumped from the delta and transported south. We are just as much a part of the delta ecosystem as the creatures and people Immediately in or adjacent to the delta.
Individual	Todd Neves, Farmer of Westlands Water District	…I would strongly like to invite you to a more ground zero here on, maybe Mendota. Somewhere where we can get more participation…what we really need is a reliable and a consistent allocation. It's so hard on our operations -- I'll just give you a brief example. When we get a 10 percent, a 30 percent, a 40 percent allocation, we're idling land. We're -- our next step will be laying off employees…We do everything in our power to be efficient with our water…My farm I purchased in 1999. I have paid more to conserve water by switching to drip irrigation, drilling wells to supplement water, I have paid more for those irrigation conservations than I did for my actual ranch… running wells and stuff, those are band aids, those are not long-term fixes for our operations.
Individual	William M. Ragsdale, Resident of Fresno, California	Why let Sacramento and other citys along the Sac River drain their sewers and waste into the river instead of build sewer plant and save all the water to be used instead of running it into the S.F. Bay or Ocean. Brain dead people can not figure that out??

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Individual	Frank and Judy Williams, Farmers near Firebaugh, California	We live in Firebaugh, California and farm on the west side of Fresno County in the Westlands Water District with Mark: and Mary Fickett. We have farmed out here since 1985. Our permanent crops are almonds and pomegranates. When we have more allocation, we have planted grain, cotton, dehydrated onions, cucumbers, beans, and melons. In 2009/2010 was a devastating year for us not only financially, but emotionally. We were financed with an almond company and they denied our financing prior to our receiving our 10% allocation on April 20th . Knowing that we only had 10% water. we knew our only option was to hopefully be able to keep our trees alive. We knew we would have no viable crop that year and just shook the unmarketable nuts to the ground and shredded them. We had to layoff more than half of our labor force. This was not only devastating to our employees, but to the local businesses in the community. Because of so many foreclosures In this area, our home values have plummeted. We tried to refinance our home to get a lower interest rate and the banker informed us that: because of all the foreclosures, our home is In a zero dollar tone. Basically. our home is worth nothing. Where we farm, there is not an option to financially have a well for groundwater. The uncertainty of allocation affects everything we do. Our financing depends upon how much allocation we receive. It also affects if we can plant other crops and hire additional employees. Our biggest fear is that we have another year like 2009/2010. It is hard to plan your future when there are so many unknowns with our water supply. We don't believe we could survive another year like 2009/2010.

Attachment A

Notice of Intent and Notice of Extension

associated impacts of each. Alternative 3 (Preferred Alternative) would implement the GCP as proposed.

Authority: The environmental review of this project is being conducted in accordance with the requirements of the National Environmental Policy Act of 1969 as amended (42 U.S.C. 4321 *et seq.*) and its implementing regulations (40 CFR parts 1500 through 1508), and with other appropriate Federal laws and regulations, policies, and procedures of the Service for compliance with those regulations.

Dated: February 17, 2012.

Mark J. Musaus,

Acting Regional Director.

[FR Doc. 2012–7370 Filed 3–27–12; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLNML00000 L12200000.DF0000]

Notice of Public Meeting, Las Cruces District Resource Advisory Council Meeting, New Mexico

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of public meeting.

SUMMARY: In accordance with the Federal Land Policy and Management Act and the Federal Advisory Committee Act of 1972, the U.S. Department of the Interior, Bureau of Land Management (BLM), Las Cruces District Resource Advisory Council (RAC), will meet as indicated below.

DATES: The meeting date is April 11 2012, at the BLM Las Cruces District Office, 1800 Marquess Street, Las Cruces, NM 88005, from 10 a.m.–4 p.m. The public may send written comments to the RAC at the above address.

FOR FURTHER INFORMATION CONTACT: Rena Gutierrez, BLM Las Cruces District, 1800 Marquess Street, Las Cruces, NM 88005, 575–525–4338. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8229 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: The 10-member RAC advises the Secretary of the Interior, through the BLM, on a variety of planning and management issues associated with public land management in New Mexico.

Planned agenda items include opening remarks from the District Manager, access issues, illegal trash dumps, and the Social-Economic Strategic Plan.

A half-hour public comment period during which the public may address the Council will begin at 2:30 p.m. on April 11, 2012. All RAC meetings are open to the public.

Depending on the number of individuals wishing to comment and time available, the time for individual oral comments may be limited.

Bill Childress,

District Manager, Las Cruces.

[FR Doc. 2012–7408 Filed 3–27–12; 8:45 am]

BILLING CODE 4310–VC–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project: Notice of Intent To Prepare an Environmental Impact Statement and Notice of Scoping Meetings

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of intent and scoping meetings.

SUMMARY: The Bureau of Reclamation intends to prepare an environmental impact statement for modifications to the continued long-term operation of the Central Valley Project, in a coordinated manner with the State Water Project, that are likely to avoid jeopardy and destruction or adverse modification of designated critical habitat. We are seeking suggestions and information on the alternatives and topics to be addressed and any other important issues related to the proposed action.

DATES: Submit written comments on the scope of the environmental impact statement by May 29, 2012.

Four public scoping meetings will be held to solicit public input on alternatives, concerns, and issues to be addressed in the environmental impact statement:

1. Wednesday, April 25, 2012, 6 p.m. to 8 p.m., Madera, CA.
2. Thursday, April 26, 2012, 6 p.m. to 8 p.m., Diamond Bar, CA.
3. Wednesday, May 2, 2012, 2 p.m. to 4 p.m., Sacramento, CA.
4. Thursday, May 3, 2012, 6 p.m. to 8 p.m., Marysville, CA.

ADDRESSES: Send written comments to Janice Piñero, Endangered Species Compliance Act Specialist, Bureau of Reclamation, Bay-Delta Office, 801 I Street Suite 140, Sacramento, CA 95814–2536; fax to (916) 414–2439; or email at *jpinero@usbr.gov.*

The scoping meetings will be held at the following locations:

1. Madera—Madera County Mail Library, Blanche Galloway Room, 121 N. G Street, Madera, CA 93637.
2. Diamond Bar—South Coast Air Quality Management District, Room CC6, 21865 Copley Dr., Diamond Bar, CA 91765.
3. Sacramento—Federal Building, 650 Capitol Mall, Stanford Room, Sacramento, CA 95814.
4. Yuba County Government Center, Board of Supervisors Chambers, 915 Eighth St., Marysville, CA 95901.

FOR FURTHER INFORMATION CONTACT: Janice Piñero at (916) 414–2428; or email at *jpinero@usbr.gov.*

SUPPLEMENTARY INFORMATION:

I. Agencies Involved
II. Why We Are Taking This Action
III. Results of Litigation
IV. Purpose and Need for Action
V. Project Area
VI. Alternatives To Be Considered
VII. Statutory Authority
VIII. Request for Comments
IX. Public Disclosure
X. How To Request Reasonable Accommodation

I. Agencies Involved

We, the Bureau of Reclamation, are the lead Federal agency. We will invite the following agencies to participate as cooperating agencies for preparation of the environmental impact statement (EIS) in accordance with the National Environmental Policy Act (NEPA), as amended:

- U.S. Fish and Wildlife Service (USFWS),
- National Marine Fisheries Service (NMFS),
- U.S. Army Corps of Engineers; and
- U.S. Environmental Protection Agency (EPA).

We have also identified other Federal, State, and local agencies (e.g., California Department of Water Resources, California Department of Fish and Game, State and Federal Contractors Water Agency, etc.) as potential cooperating agencies, and we will invite them to participate as such in the near future.

II. Why We Are Taking This Action

The Central Valley Project (CVP) is the largest Federal Reclamation project. We operate the CVP in coordination with the State Water Project (SWP), under the Coordinated Operation Agreement between the Federal government and the State of California

(authorized by Pub. L. 99–546). Reclamation's 2008 Biological Assessment, as modified by general changes due to the passage of time and those items that have been litigated or legislated since the completion of the BA, describes operation of the projects.

In December 2008, USFWS issued a Biological Opinion analyzing the effects of the coordinated long-term operation of the CVP and SWP in California. The USFWS Biological Opinion:

• Concluded that "the coordinated operation of the CVP and SWP, as proposed, [was] likely to jeopardize the continued existence of the delta smelt" and "adversely modify delta smelt critical habitat."

• Included a Reasonable and Prudent Alternative for CVP and SWP operations designed to allow the projects to continue operating without causing jeopardy or adverse modification.

On December 15, 2008, we provisionally accepted and then implemented the USFWS Reasonable and Prudent Alternative.

In June 2009, NMFS issued a Biological Opinion analyzing the effects of the coordinated long-term operation of the CVP and SWP on listed salmonids, green sturgeon and southern resident killer whale. This Biological Opinion concluded that the long-term operation of the CVP and SWP, as proposed, was likely to:

• Jeopardize the continued existence of Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, southern distinct population segment (DPS) of North American green sturgeon, and southern resident killer whales.

• Destroy or adversely modify critical habitat for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead and the Southern DPS of North American green sturgeon.

The NMFS Biological Opinion included a Reasonable and Prudent Alternative designed to allow the projects to continue operating without causing jeopardy or adverse modification. On June 4, 2009, we provisionally accepted and then implemented the NMFS Reasonable and Prudent Alternative.

Several lawsuits were filed in the United States District Court for the Eastern District of California (the Court) challenging various aspects of the USFWS and NMFS Biological Opinions and our acceptance and implementation of the associated Reasonable and Prudent Alternatives.

III. Results of Litigation

The results of the above lawsuits were as follows.

• On November 16, 2009, the Court ruled that we violated NEPA by failing to conduct a NEPA review of the potential impacts to the human environment before provisionally accepting and implementing the 2008 USFWS Biological Opinion and Reasonable and Prudent Alternative.

• On March 5, 2010, the Court held that we violated NEPA by failing to undertake a NEPA analysis of potential impacts to the human environment before accepting and implementing the Reasonable and Prudent Alternative in the 2009 NMFS Biological Opinion.

• On December 14, 2010, the Court found certain portions of the USFWS Biological Opinion to be arbitrary and capricious, and remanded those portions of the Biological Opinion to USFWS. The Court ordered us to review the Biological Opinion and Reasonable and Prudent Alternative in accordance with NEPA.

• On September 20, 2011, in the Consolidated Salmonid Cases, the Court remanded the NMFS Biological Opinion to NMFS.

We now have an opportunity to initiate a combined NEPA process addressing both the USFWS and NMFS Reasonable and Prudent Alternatives. To that end, we are beginning this combined NEPA process to analyze the effects of modifications to the coordinated long-term operation of the CVP and SWP that are likely to avoid jeopardy to listed species and destruction or adverse modification of designated critical habitat.

IV. Purpose and Need for Action

The purpose of the action is to continue the operations of the CVP, in coordination with the SWP, as described in the 2008 Biological Assessment (as modified) to meet its authorized purposes, in a manner that:

• Is consistent with Federal Reclamation law, applicable statutes, previous agreements and permits, and contractual obligations;

• Avoids jeopardizing the continued existence of federally listed species; and

• Does not result in destruction or adverse modification of designated critical habitat.

Continued operation of the CVP is needed to provide flood control, water supply, fish and wildlife restoration and enhancement, and power generation. It also provides navigation, recreation, and water quality benefits. However, coordinated operation of the CVP, as described in the 2008 Biological Assessment was found to likely jeopardize the continued existence of listed species and adversely modify critical habitat. The ESA requires Federal agencies to insure that their actions are not likely to jeopardize listed species or result in the destruction or adverse modification of critical habitat. Modifications to the coordinated operation of the CVP and SWP to be evaluated should be consistent with the intended purpose of the action, within the scope of our legal authority and jurisdiction, economically and technologically feasible, and avoid the likelihood of jeopardizing listed species or resulting in the destruction or adverse modification of critical habitat.

V. Project Area

The project area includes the CVP and SWP Service Areas and facilities, as described in this section.

A. CVP Facilities

The CVP facilities include reservoirs on the Trinity, Sacramento, American, Stanislaus, and San Joaquin rivers.

• A portion of the water from Trinity River is stored and re-regulated in Clair Engle Lake, Lewiston Lake, and Whiskeytown Reservoir, and diverted through a system of tunnels and powerplants into the Sacramento River. Water is also stored and re-regulated in Shasta and Folsom reservoirs. Water from these reservoirs and other reservoirs owned and/or operated by the SWP flows into the Sacramento River.

• The Sacramento River carries water to the Sacramento-San Joaquin Delta (Delta). The Jones Pumping Plant at the southern end of the Delta lifts the water into the Delta Mendota Canal (DMC). This canal delivers water to CVP contractors, who divert water directly from the DMC, and exchange contractors on the San Joaquin River, who divert directly from the San Joaquin River and the Mendota Pool. CVP water is also conveyed to the San Luis Reservoir for deliveries to CVP contractors through the San Luis Canal. Water from the San Luis Reservoir is also conveyed through the Pacheco Tunnel to CVP contractors in Santa Clara and San Benito counties.

• The CVP provides water from Millerton Reservoir on the San Joaquin River to CVP contractors located near the Madera and Friant-Kern canals. Water is stored in the New Melones Reservoir for water rights holders in the Stanislaus River watershed and CVP contractors in the northern San Joaquin Valley.

B. State Water Project Facilities

The Department of Water Resources operates and maintains the SWP, which delivers water to agricultural and municipal and industrial (M&I) contractors in northern California, the San Joaquin Valley, the Bay Area, the Central Coast, and southern California.

• SWP water is stored and re-regulated in Lake Oroville and released into the Feather River, which flows into the Sacramento River.

• SWP water flows in the Sacramento River to the Delta and is exported from the Delta at the Banks Pumping Plant. The Banks Pumping Plant lifts the water into the California Aqueduct, which delivers water to the SWP contractors and conveys water to the San Luis Reservoir.

• The SWP also delivers water to the Cross-Valley Canal, when the systems have capacity, for CVP water service contractors.

VI. Alternatives To Be Considered

The proposed action for the purposes of NEPA will consider operational components of the 2008 USFWS and the 2009 NMFS Reasonable and Prudent Alternatives. These components address continued operation of the CVP, in coordination with the SWP, in a manner intended to avoid jeopardizing continued existence of federally listed species or result in the destruction or adverse modification of designated critical habitat.

• We expect to analyze flow management actions resulting from the 2008 USFWS Reasonable and Prudent Alternative that affect:

(1) Protection of adult, juvenile, and larval delta smelt; and

(2) Habitat improvements for delta smelt growth and rearing.

• We expect to analyze flow management actions resulting from the 2009 NMFS Reasonable and Prudent Alternative that affect:

(1) Attraction and channel maintenance flows;

(2) Reduction of thermal stress;

(3) Passage of fish at Red Bluff Diversion Dam;

(4) Reduction of redd dewatering, entrainment, and straying; and

(5) Reduction of negative hatchery influences on natural populations.

The proposed action will not consider:

• Structural changes prescribed in the NMFS 2009 Reasonable and Prudent Alternative that would require future evaluations, environmental documentation, and permitting; and

• Reasonable and Prudent Alternative actions that would require future studies.

As required by NEPA, we will develop and consider a proposed action and a reasonable range of alternatives, including a No Action Alternative. Reasonable alternatives to the proposed action may include physical changes or changes in operations of CVP facilities.

Alternatives could affect all or various components of the CVP, and may also include actions that affect SWP operations. We will engage with the Department of Water Resources in developing the proposed action and alternatives. We will also consider including in the alternative analysis reasonable alternatives to the proposed action identified through the scoping process.

VII. Statutory Authority

NEPA [42 U.S.C. 4321 *et seq.*] requires that Federal agencies conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the human environment. In addition, as required by NEPA, Reclamation will analyze in the EIS the potential direct, indirect, and cumulative environmental effects that may result from the implementation of the proposed action and alternatives, which may include, but are not limited to, the following areas of potential impact:

a. Water resources, including groundwater;

b. Land use, including agriculture;

c. Socioeconomics;

d. Environmental justice;

e. Biological resources, including fish, wildlife, and plant species;

f. Cultural resources;

g. Water quality;

h. Air quality;

i. Soils, geology, and mineral resources;

j. Visual, scenic, or aesthetic resources;

k. Global climate change;

l. Indian trust assets

m. Transportation; and

n. Recreation.

VII. Request for Comments

The purposes of this notice are:

• To advise other agencies, CVP and SWP water and power contractors, affected tribes, and the public of our intention to gather information to support the preparation of an EIS;

• To obtain suggestions and information from other agencies, interested parties, and the public on the scope of alternatives and issues to be addressed in the EIS; and

• To identify important issues raised by the public related to the development and implementation of the proposed action.

We invite written comments from interested parties to ensure that the full range of alternatives and issues related to the development of the proposed action are identified. Comments during this stage of the scoping process will only be accepted in written form. Written comments may be submitted by mail, electronic mail, facsimile transmission or in person (see **ADDRESSES**). Comments and participation in the scoping process are encouraged.

IX. Public Disclosure

Before including your name, address, phone number, email address or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

X. How To Request Reasonable Accommodation

If special assistance is required at one of the scoping meetings, please contact Janice Piñero at the information provided above *mailto:* or TDD 916–978–5608, at least five working days before the meetings. Information regarding this proposed action is available in alternative formats upon request.

Dated: March 14, 2012.

Anastasia T. Leigh,

Regional Environmental Officer, Mid-Pacific Region.

[FR Doc. 2012–7488 Filed 3–27–12; 8:45 am]

BILLING CODE 4310–MN–P

INTERNATIONAL TRADE COMMISSION

[DN 2885]

Certain Consumer Electronics, Including Mobile Phones and Tablets; Notice of Receipt of Complaint; Solicitation of Comments Relating to the Public Interest

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has received a complaint entitled Certain Consumer Electronics, Including Mobile Phones and Tablets, DN 2885; the Commission is soliciting comments on any public interest issues

Monday through Friday, except holidays.

Before including your phone number, email address, or other personal identifying information in your protest, you should be aware that your entire protest—including your personal identifying information—may be made publicly available at any time. While you can ask us in your protest to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Authority: 40 CFR 1506.6 and 1506.10; 43 CFR 1610.2 and 1610.5

Cindy Staszak,

Acting Deputy State Director, California.

[FR Doc. 2012–12560 Filed 5–24–12; 8:45 am]

BILLING CODE 4310–40–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLNMA00000 L12200000.DF0000]

Notice of Public Meeting, Albuquerque Resource Advisory Council Meeting

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of public meeting.

SUMMARY: In accordance with the Federal Land Policy and Management Act and the Federal Advisory Committee Act of 1972, the U.S. Department of the Interior, Bureau of Land Management, Albuquerque District Resource Advisory Council (RAC), will meet as indicated below.

DATES: The meeting date is June 22, 2012, at the Albuquerque District Office, 435 Montano Rd., NE., Albuquerque, New Mexico 87107. The meeting is scheduled from 9 a.m. to 4 p.m. The public comment period will begin at 3:30 p.m. The public may send written comments to the RAC at the above address. All RAC meetings are open to the public. Depending on the number of individuals wishing to comment and time available, the time for individual oral comments may be limited.

FOR FURTHER INFORMATION CONTACT: Gina Melchor, Albuquerque District Office, 435 Montano Rd., NE., Albuquerque, New Mexico 87107, 505–761–8935. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8229 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: The 10-member RAC advises the Secretary of the Interior, through the Bureau of Land Management, on a variety of planning and management issues associated with public land management in New Mexico.

At this meeting, topics include a discussion on the RAC Charter and Operating Procedures, Election of Officers, and presentations from the Socorro and Rio Puerco Field Office Managers.

Edwin J. Singleton,

District Manager.

[FR Doc. 2012–12657 Filed 5–24–12; 8:45 am]

BILLING CODE 4310–AG–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of extension of public comment period for the scoping process.

SUMMARY: The Bureau of Reclamation is extending the public comment period for the scoping process to June 28, 2012. We published the notice of intent in the **Federal Register** on March 28, 2012 (77 FR 18858). The public review was originally scheduled to end on May 29, 2012.

DATES: Written comments as part of the scoping process will be accepted on or before June 28, 2012.

ADDRESSES: Send written comments to Janice Piñero, Endangered Species Compliance Act Specialist, Bureau of Reclamation, Bay-Delta Office, 801 I Street, Suite 140, Sacramento, CA 95814–2536; fax to (916) 414–2439; or email at *jpinero@usbr.gov.*

FOR FURTHER INFORMATION CONTACT: Janice Piñero at (916) 414–2428; or email at *jpinero@usbr.gov.*

Public Disclosure

Before including your name, address, phone number, email address or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Dated: May 7, 2012.

Anastasia T. Leigh,

Regional Environmental Officer, Mid-Pacific Region.

[FR Doc. 2012–12738 Filed 5–24–12; 8:45 am]

BILLING CODE 4310–MN–P

DEPARTMENT OF JUSTICE

Drug Enforcement Administration

Importer of Controlled Substances; Notice of Application; Alltech Associates, Inc.

Pursuant to 21 U.S.C. 958(i), the Attorney General shall, prior to issuing a registration under this Section to a bulk manufacturer of a controlled substance in Schedule I or II, and prior to issuing a regulation under 21 U.S.C. 952(a)(2) authorizing the importation of such a substance, provide manufacturers holding registrations for the bulk manufacture of the substance an opportunity for a hearing.

Therefore, in accordance with 21 CFR 1301.34(a), this is notice that on April 19, 2012, AllTech Associates Inc., 2051 Waukegan Road, Deerfield, Illinois 60015, made application by renewal to the Drug Enforcement Administration (DEA) to be registered as an importer of the following basic classes of controlled substances:

Drug	Schedule
Gamma Hydroxybutyric Acid (2010).	I
Lysergic acid diethylamide (7315)	I
Heroin (9200)	I
Cocaine (9041)	II
Codeine (9050)	II
Hydrocodone (9193)	II
Meperidine (9230)	II
Methadone (9250)	II
Morphine (9300)	II

The company plans to import these controlled substances for the manufacture of reference standards.

Any bulk manufacturer who is presently, or is applying to be, registered with DEA to manufacture such basic classes of controlled substances may file comments or objections to the issuance of the proposed registration and may, at the same time, file a written request for a hearing on such application pursuant to 21 CFR 1301.43, and in such form as prescribed by 21 CFR 1316.47.

Any such written comments or objections should be addressed, in quintuplicate, to Drug Enforcement Administration, Office of Diversion

Attachment B

Reclamation News Releases and Typical Newspaper Notification

News Release RECLAMATION *Managing Water in the West*

Mid-Pacific Region
Sacramento, CA

MP-12-043

Media Contact: Pete Lucero, 916-978-5100, plucero@usbr.gov

For Release On: March 28, 2012

Public Scoping Meetings Planned on EIS for Remanded BOs on the Coordinated Long-Term Operation of the CVP and SWP

The Bureau of Reclamation today announced that public scoping meetings will be held to prepare an Environmental Impact Statement (EIS) for the Remanded Biological Opinions (BOs) on the Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP). A Notice of Intent to prepare the EIS and conduct public scoping meetings was published in the Federal Register on Wednesday, March 28, 2012. This EIS will be developed in accordance with the National Environmental Policy Act (NEPA).

The U.S. District Court for the Eastern District of California remanded portions of the U.S. Fish and Wildlife Service and National Marine Fisheries Service BOs to their respective agencies. This EIS responds to the District Court's order that Reclamation analyze and disclose, in accordance with NEPA, the potential impacts of implementing the Reasonable and Prudent Alternatives (RPAs) developed pursuant to the remanded USFWS and NMFS BOs.

Four public scoping meetings to solicit input on issues and alternatives to be addressed in the EIS are scheduled to be held:

- **Wednesday, April 25, 6-8 p.m.**-Madera County Main Library, Blanche Galloway Room, 121 North G Street, Madera, CA 93637
- **Thursday, April 26, 6-8 p.m.**-South Coast Air Quality Management District, Room CC6, 21865 Copley Drive, Diamond Bar, CA 91765
- **Wednesday, May 2, 2-4 p.m.**-John E. Moss Federal Building, Stanford Room, 650 Capitol Mall, Sacramento, CA 95814
- **Thursday, May 3, 6-8 p.m.**-Yuba County Government Center, Board of Supervisors Chambers, 915 Eighth Street, Marysville, CA 95901

Written comments associated with the Notice of Intent and the scoping process must be received by close of business on Tuesday, May 29, 2012, and should be mailed to Janice Piñero, Endangered Species Act Specialist, Bureau of Reclamation, Bay-Delta Office, 801 I Street, Suite 140, Sacramento, CA 95814-2536; faxed to 916-414-2439; or e-mailed to jpinero@usbr.gov. For further information, please contact Ms. Piñero at 916-414-2428 or e-mail jpinero@usbr.gov. Project updates will be made available on Reclamation's Bay-Delta Office website at www.usbr.gov/mp/BayDeltaOffice.

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Reclamation is the largest wholesale water supplier and the second largest producer of hydroelectric power in the United States, with operations and facilities in the 17 Western States. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at http://www.usbr.gov.

News Release RECLAMATION
Managing Water in the West

Mid-Pacific Region
Sacramento, CA

MP-12-082

Media Contact: Pete Lucero, 916-978-5100, plucero@usbr.gov

For Release On: May 25, 2012

Extension of Public Scoping Comment Period on the EIS for the Remanded Biological Opinions on the Coordinated Long-Term Operation of the CVP and SWP

SACRAMENTO, Calif. – Reclamation announced today an extension of the comment period for the public scoping process on the Environmental Impact Statement (EIS) for the Remanded Biological Opinions (BOs) on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project to June 28, 2012. The public scoping comment period was originally scheduled to end on May 29, 2012. Reclamation published the Notice of Intent (NOI) in the Federal Register on March 28, 2012 (77 FR 18858).

The U.S. District Court for the Eastern District of California remanded portions of the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) BOs to their respective agencies. This EIS responds to the District Court's order that Reclamation analyze and disclose, in accordance with the National Environmental Policy Act, the potential impacts of implementing the Reasonable and Prudent Alternatives developed pursuant to the remanded USFWS and NMFS BOs.

Written comments associated with the NOI and the scoping process should be mailed to Janice Piñero, Endangered Species Act Specialist, Bureau of Reclamation, Bay-Delta Office, 801 I Street, Suite 140, Sacramento, CA 95814; faxed to 916-414-2439, or emailed to jpinero@usbr.gov. For further information, please contact Ms. Piñero at 916-414-2428 or email jpinero@usbr.gov.

Project updates are available on Reclamation's Bay-Delta Office website at www.usbr.gov/mp/BayDeltaOffice.

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Reclamation is the largest wholesale water supplier and the second largest producer of hydroelectric power in the United States, with operations and facilities in the 17 Western States. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at http://www.usbr.gov.

Public Scoping Meetings Planned on EIS for Remanded BOs on the Coordinated Long-Term Operation of the CVP and SWP

Public scoping meetings will be held to prepare an Environmental Impact Statement (EIS) for the Remanded Biological Opinions (BOs) on the Coordinated Long-term Operation of the Central Valley Project (CVP) and State Water Project (SWP). A Notice of Intent to prepare the EIS and conduct public scoping meetings was published in the Federal Register on Wednesday, March 28, 2012. This EIS will be developed in accordance with the National Environmental Policy Act (NEPA).

The U.S. District Court for the Eastern District of California remanded portions of the U.S. Fish & Wildlife Service and National Marine Fisheries Service BOs to their respective agencies. This EIS responds to the District Court's order that Reclamation analyze and disclose, in accordance with NEPA, the potential impacts of implementing the Reasonable and Prudent Alternatives developed pursuant to the remanded USFWS and NMFS BOs.

Four public scoping meetings to solicit input on issues and alternatives to be addressed in the EIS are scheduled to be held:

- **Wednesday, April 25, 6–8 pm**
  Madera County Main Library, Blanche Galloway Room
  121 North G Street, Madera, CA 93637
- **Thursday, April 26, 6–8 pm**
  South Coast Air Quality Management District, Room CC6
  21865 Copley Drive, Diamond Bar, CA 91765
- **Wednesday, May 2, 2–4 pm**
  John E. Moss Federal Building, Stanford Room
  650 Capitol Mall, Sacramento, CA 95814
- **Thursday, May 3, 6–8 pm**
  Yuba County Government Center
  Board of Supervisors Chambers
  915 Eighth Street, Marysville, CA 95901

Written comments associated with the Notice Of Intent and the scoping process must be received by close of business on Tuesday, May 29, 2012, and should be mailed to Janice Piñero, Endangered Species Act Specialist, Bureau of Reclamation, Bay-Delta Office, 801 I Street, Suite 140, Sacramento, CA 95814-2536; faxed to 916-414-2439; or e-mailed to jpinero@usbr.gov.

For further information, please contact Ms. Piñero at 916-414-2428 or e-mail jpinero@usbr.gov. Project updates will be made available on Reclamation's Bay-Delta Office website at www.usbr.gov/mp/BayDeltaOffice.

Attachment C

Scoping Meeting Materials

1. Scoping Meeting Agenda (English and Spanish)
2. Scoping Meeting Fact Sheet (English and Spanish)
3. Scoping Meeting Comment Card (English and Spanish)
4. Scoping Meeting Speaker Card
5. Scoping Meeting Presentation

RECLAMATION
Managing Water in the West

Public Scoping Meeting Agenda

EIS for Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

Thank you for attending today's Public Scoping Meeting and helping with the first steps in preparing an environmental impact statement (EIS) for the Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project (Remand EIS). Public Scoping Meetings are held as part of the EIS process through which an implementing agency describes a proposed action and its planned approach to analysis. The agency then seeks input from other agencies, organizations, and the public on environmental issues to be considered, potential impacts, and possible alternatives to the proposed action. We encourage you to provide us with information on your issues of concern. Please visit our website at www.usbr.gov/mp/BayDeltaOffice to stay informed.

- **Overview of Presentation.** Reclamation representatives will describe the purpose of the meeting and provide an overview of the EIS and public involvement processes.
- **Public Comment Session.** In addition to your written comments, if you wish to make a verbal comment, please fill out a Speaker's Card from the Welcome Table and hand it to the Facilitator. Speakers will be called in the order in which Speaker Cards are submitted with the exception of elected officials, who will be called first. Comments will be recorded by the transcriber who will prepare a written record of the Scoping Meeting.
- **Individual Comment Session.** Following the public comment period at this meeting, individuals can provide verbal comments to the transcriber in a more private setting.

Scoping Meeting Schedule

Madera **Wednesday** **April 25, 2012** **6:00 - 8:00 pm**	**Diamond Bar** **Thursday** **April 26, 2012** **6:00 - 8:00 pm**	**Sacramento** **Wednesday** **May 2, 2012** **2:00 - 4:00 pm**	**Marysville** **Thursday** **May 3, 2012** **6:00 - 8:00 pm**
Madera County Main Library, Blanche Galloway Room 121 North G Street, Madera, CA 93637	South Coast Air Quality Management District, Room CC6 1865 Copley Drive, Diamond Bar, CA 91765	John E. Moss Federal Building, Stanford Room 650 Capitol Mall, Sacramento, CA 95814	Yuba County Govt Center, Board of Supervisors Chambers 915 Eighth Street, Marysville, CA 95901

CVP/SWP Facilities
& Service Areas
TRINITY LAKE
SHASTA LAKE
WHISKEYTOWN LAKE
Tehama-Colusa Canal
Corning Canal
LAKE OROVILLE
THERMALITO AFTERBAY
Tehama-Colusa Canal
FOLSOM LAKE
LAKE NATOMA
Folsom South Canal
HARVEY BANKS
PUMPING PLANT
TRACY FISH COLLECTION FACILITY
NEW MELONES RESERVOIR
Contra Costa Canal
JONES PUMPING PLANT
BETHANY FOREBAY
California Aqueduct
Delta-Mendota Canal
O'NEILL FOREBAY
SAN LUIS RESERVOIR
San Luis Canal
Madera Canal
Santa Clara Conduit
MILLERTON RESERVOIR
Hollister Conduit
Pacheco Conduit
LOS BANOS RES.
Friant-Kern Canal
Coalinga Canal
Coastal Branch
California Aqueduct
California Aqueduct
West Branch California Aqueduct
Ownership
FEDERAL AGENCY
STATE AGENCY
STATE/FED PROJECT
State Water Projects Place of Use
Federal Consolidated Place of Use
Miles
0 25 50 100 150
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W
E
S

Agenda de Reunión Pública

Declaración de Impacto Ambiental para las Opiniones Biológicas Devueltas sobre la Operación Coordinada de Largo Plazo del Proyecto del Valle Central y el Proyecto Estatal de Agua

Gracias por asistir a la reunión pública de hoy y ayudar con los primeros pasos para preparar una declaración de impacto ambiental para las Opiniones Biológicas Remitidas sobre la Operación Coordinada de Largo Plazo del Proyecto del Valle Central y el Proyecto Estatal de Agua Las Reuniones Públicas se realizan como parte del proceso de la declaración ambiental a través del cual una agencia ejecutora describe una propuesta de acción y el enfoque planeado para que sean analizados. Luego la agencia busca contribuciones de otras agencias, organizaciones y el público sobre los temas ambientales a considerarse, y posibles impactos y alternativas a la acción propuesta. Lo alentamos a que nos dé información sobre los temas que le preocupan. Por favor, visite nuestro sitio Web en www.usbr.gov/mp/BayDeltaOffice para mantenerse informado.

- **Visión General de la Presentación.** Representantes del *Bureau of Reclamation* describirán el propósito de la reunión y ofrecerán una visión general de los procesos de la declaración ambiental y la participación del público.
- **Sesión de Comentarios Públicos.** Además de sus comentarios por escrito, si desea hacer un comentario verbal, por favor complete la Tarjeta de Presentador de la Mesa de Bienvenida y entréguesela al Moderador. Los presentadores se llamarán en el orden en el que se hayan presentado las Tarjetas de Presentadores, con excepción de autoridades electas, que tendrán prioridad. Los comentarios serán grabados por un transcriptor que preparará un informe escrito de la Reunión Pública.
- **Sesión de Comentarios Individuales.** Después del período de comentarios públicos en esta reunión, los individuos pueden ofrecer comentarios verbales al transcriptor de manera más privada.

Programa de la Reunión Pública

Madera miércoles 25 de abril, 2012 6:00 - 8:00 pm	Diamond Bar jueves 26 de abril, 2012 6:00 - 8:00 pm	Sacramento miércoles 2 de mayo, 2012 2:00 - 4:00 pm	Marysville jueves 3 de mayo, 2012 6:00 - 8:00 pm
Madera County Main Library, Blanche Galloway Room 121 North G Street, Madera, CA 93637	South Coast Air Quality Management District, Room CC6 1865 Copley Drive, Diamond Bar, CA 91765	John E. Moss Federal Building, Stanford Room 650 Capitol Mall, Sacramento, CA 95814	Yuba County Govt Center, Board of Supervisors Chambers 915 Eighth Street, Marysville, CA 95901

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Fact Sheet

Public Input During Scoping

What is Scoping?

The scoping process is an opportunity for the public to identify topics to be covered in the Environmental Impact Statement (EIS) and provide recommendations to Reclamation. Your input will help Reclamation to identify:

- Significant topics to be analyzed in the EIS.
- Topics that have already been adequately addressed in prior environmental reviews.
- Potential alternatives to develop the reasonable range of alternatives.
- Potential mitigation measures for the proposed action.
- People or organizations who are interested in the EIS.

How Can I Get Involved?

Reclamation encourages the public to be involved throughout the EIS process for the Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project. For this public scoping phase, comments are being accepted through May 29, 2012.

Ways to provide comments:

- Comment Card
- Verbal comments at Scoping Meetings, including verbal comments provided within the meeting, and individual comments to Transcriber at Scoping Meetings
- Mail/Email: Janice Piñero, Endangered Species Act Specialist, Bay-Delta Office, 801 I Street, Suite 140, Sacramento, CA 95814-2536 jpinero@usbr.gov

For additional information, please visit: www.usbr.gov/mp/BayDeltaOffice.

Making the Most of Your Comments

Develop your comments, taking the following into consideration:

- What topics are of greatest concern to you and why?
- Are there additional topics that should be evaluated?
- What alternatives or mitigation measures do you think would help to lessen or avoid impacts?
- Can you suggest information resources?

What Issues Might be Addressed in the EIS?

- Water resources, including groundwater, water quality, and climate change
- Land use, including agriculture
- Socioeconomics
- Biological resources, including fish, wildlife, and plant species
- Cultural and historic resources
- Air quality and greenhouse gas emissions
- Soils, geology, and mineral resources
- Visual, scenic, or aesthetic resources
- Transportation
- Recreation
- Indian Trust Assets
- Environmental justice

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Hoja de Datos

Contribución Pública durante la Reunión

¿Qué son las Reuniones Públicas?

Las reuniones son una oportunidad para que el público identifique temas a cubrirse en la Declaración de Impacto Ambiental y ofrezca recomendaciones al *Bureau of Reclamation* Su comentario le ayudará al *Bureau of Reclamation* a identificar:

- Tópicos importantes a analizarse en la Declaración de Impacto Ambiental
- Tópicos que ya se han tratado adecuadamente en revisiones ambientales previas
- Alternativas potenciales para desarrollar la gama razonable de alternativas
- Medidas atenuantes potenciales para la acción propuesta
- Individuos u organizaciones que estén interesados en la Declaración de Impacto Ambiental

¿Cómo Puedo Participar?

El *Bureau of Reclamation* alienta al público a que participe en el proceso de la Declaración de Impacto Ambiental para las Opiniones Biológicas Devueltas sobre la Operación Coordinada de Largo Plazo del Proyecto del Valle Central y el Proyecto Estatal del Agua. Para esta etapa de opiniones del público, los comentarios se recibirán hasta el 29 de mayo del 2012.

Formas para presentar los comentarios:

- Tarjeta de Comentarios
- Comentarios verbales durante las reuniones públicas, incluyendo los comentarios hechos en la reunión, y los comentarios individuales al Transcriptor en las reuniones
- Por correo/correo electrónico: Janice Piñero, especialista de la ley de especies en peligro de extinción, Oficina Bahía-Delta, 801 I Street, Suite 140, Sacramento, CA 95814-2536 jpinero@usbr.gov

Para mayor información, por favor visite: www.usbr.gov/mp/BayDeltaOffice.

Cómo Hacer sus Comentarios

Haga sus comentarios considerando lo siguiente:

- ¿Cuáles son los temas que más le preocupan y por qué?
- ¿Hay más tópicos que se deberían evaluar?
- ¿Qué alternativas o medidas atenuantes cree que ayudarían a disminuir o evitar impactos negativos?
- ¿Puede sugerir fuentes de información?

¿Qué Temas se Deberían Tratar en la Declaración de Impacto Ambiental ?

- Fuentes de agua, incluyendo agua subterránea, calidad de agua, y cambio climático
- Uso de la tierra, incluyendo agricultura
- Asuntos socioeconómicos
- Recursos biológicos, incluyendo peces, vida silvestre y plantas.
- Recursos culturales e históricos
- Calidad del aire y emisiones de gases de efecto invernadero
- Tierras, geología, y recursos minerales
- Recursos visuales, panorámicos, o recursos estéticos
- Transporte
- Recreación
- Bienes de fundaciones indígenas
- Justicia medioambiental

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Written Comments for

EIS for Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

Written comments can be submitted at the scoping meetings, mailed to the Bureau of Reclamation (*mailing address on back of this card*), faxed to (916) 414-2439, or emailed to *jpinero@usbr.gov* by close of business on Tuesday, May 29, 2012. Thank you.

(Please print clearly)

Name _____

Organization and Address _____

_____

_____

Phone _____ Email _____

Date _____

_____

_____

_____

_____

_____

_____

All comments become part of the public record.

☐ I would like to receive project updates. My e-mail address is:

_____

Place 41¢
Stamp Here

Bureau of Reclamation
Bay-Delta Office
801 I Street, Suite 140
Sacramento, CA 95814-2536

Attn: Janice Piñero

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Comentarios Escritos Para

Declaración de Impacto Ambiental para las Opiniones Biológicas Remitidas sobre la Operación Coordinada de Largo Plazo del Proyecto del Valle Central y el Proyecto Estatal de Agua

Los comentarios escritos se pueden presentar en las reuniones públicas, enviar por correo al *Bureau of Reclamation* (dirección del otro lado de esta tarjeta), por fax al (916) 414-2439, o por correo electrónico a *jpinero@usbr.gov* no después del martes 29 de mayo, 2012 Gracias.

(Por favor, imprima claramente)

Nombre
_____

Organización y Dirección _____

_____

_____

Teléfono _____ Correo electrónico _____

Fecha _____

_____

_____

_____

_____

_____

Todos los comentarios son parte del récord público.

☐ Me gustaría recibir actualizaciones del proyecto. Mi dirección electrónica es:

_____

U.S. Department of the Interior
Bureau of Reclamation

Pegue aquí
una
estampilla

Bureau of Reclamation
Bay-Delta Office
801 I Street, Suite 140
Sacramento, CA 95814-2536

Attn: Janice Piñero

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Speaker Card for

EIS for Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

Please fill out the card if you would like to make a verbal comment. Please note, verbal comments are weighted equally with written comments. Written comments also may be submitted at scoping meetings, mailed to the Bureau of Reclamation (*mailing address on back of this card*), faxed to (916) 414-2439, or emailed to *jpinero@usbr.gov* by close of business on Tuesday, May 29, 2012. Thank you.

(Please print clearly)

Name _____

Organization and Address _____

_____

_____

Phone _____ Email _____

Date _____

Notes _____

_____

_____

_____

_____

_____

Please read suggested speaker guidelines on the back side of this card.

☐ I would like to receive project updates. My e-mail address is:

_____

Speaker Guidelines

1. Speaker Cards: Please hand your Speaker Card to one of the Facilitators. Speakers will be called toward the microphone in the order that the cards are received with the exception of elected officials, who will be called first.

2. Time: To allow enough time for all people who want to make a comment, please attempt to limit your comments to about 3 minutes. If there is time available after the last speaker provides their first comment, speakers can provide further comments.

3. All Comments will be Recorded: All comments will be recorded by a court transcriber and will be included in the public record through inclusion in the future Scoping Report.

4. Speakers' Role: The role of the speakers is to let Reclamation know what you would like to be studied during the environmental review.

5. Reclamation's Role: Reclamation will be listening to your comments tonight. There will be future public workshops and meetings during the preparation of the environmental document at which time Reclamation will be able to provide information about this project.

6. Courtesies:

- Please allow one speaker at a time.
- Do not add comments from the audience.
- Please put your cell phones on "silent" or "vibrate" modes.

7. Send Scoping Comments to:

- Janice Piñero, Endangered Species Act Specialist
  Bay-Delta Office
  801 I Street, Suite 140, Sacramento, CA 95814-2536

  jpinero@usbr.gov

For additional information, please visit: www.usbr.gov/mp/BayDeltaOffice.

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Environmental Impact Statement

Remanded Biological Opinions on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project

U.S. Department of the Interior
Bureau of Reclamation

Public Scoping Meetings Agenda

- Overview
- Scoping process
- Public comment forum

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Purpose of Scoping

- Invite public comments
- Obtain insights and specific local information related to issues for Environmental Impact Statement (EIS)
- Obtain input on alternatives to be considered in the EIS
- PLEASE PROVIDE WRITTEN COMMENTS, TOO!

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Why is Reclamation Preparing this EIS?

2008	• Reclamation issued a Biological Assessment on Long-Term Operations of the Central Valley Project & State Water Project • U.S. Fish and Wildlife Service (USFWS) Biological Opinion issued for delta smelt populations and their critical habitat • Reclamation accepted the Reasonable and Prudent Alternative (RPA)
2009	• National Marine Fisheries Service (NMFS) Biological Opinion issued for salmonids, green sturgeon, and Southern resident killer whale populations and their critical habitat • Reclamation accepted the RPA

2011	• Following several litigations, U.S. District Court ruled that:
	  • Portions of the USFWS and NMFS BOs remanded to USFWS and NMFS
	  • Reclamation should review potential impacts to human environment prior to accepting and implementing the RPAs
	• Reclamation is initiating a combined National Environmental Policy Act process to evaluate USFWS and NMFS RPAs or alternatives to the RPAs

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What is a Biological Opinion?

- Section 7(a)(2) of the Endangered Species Act requires:
  - Federal agencies, in consultation with USFWS and/or the NMFS, to ensure that actions they authorize, fund, or implement are not likely to jeopardize the continued existence of federally-listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat of these species
- A BO is the technical document that evaluates the effects of the Federal action
- If jeopardy is likely, a BO may include a RPA

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What is an EIS?

- Purpose of an EIS
  - To evaluate a reasonable range of alternatives
  - To identify potential benefits and adverse impacts, and propose mitigation to reduce/avoid impacts
  - To provide information for public review and comment
  - To support decision making process by the Federal agency
  - Prepared in accordance with NEPA
- An EIS addresses more issues than a BO
  - Water Resources
  - Other Physical Resources - such as Air Quality
  - Biological Resources - including non- federally-listed threatened or endangered species
  - Human Resources - including land use, socioeconomics, and cultural resources

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What will this EIS Consider?

- This EIS will consider conditions through 2030
- This EIS will consider the operational components of the USFWS and NMFS RPAs or alternatives to the RPAs
- This EIS will include both site-specific and programmatic analyses based upon available definition of potential actions within the alternatives

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When will the EIS be Complete?

- **March 2012** — **Initiate Scoping for EIS**

<u>Deadlines in accordance with Court Orders</u>

- **December 2013** — **Final EIS associated with USFWS BO**
- **April 2016** — **Final EIS associated with NMFS BO**

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Public Input During Scoping Process

- Your input will help shape the EIS
  - What alternatives should be considered?
  - What environmental issues should be evaluated?
  - When and how would you like to be informed?
- What happens to comments?
  - Comments will be compiled in a Scoping Report which will be made available to the public on Reclamation's website

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How Can You Provide Comments?

- **Comments for Scoping Report due May 29, 2012**
- **To provide comments today**
  - **Comment Cards**
  - **Verbal Comments**
  - **Individual comments to transcriber**
- **To provide comments after today until May 29, 2012**
  - **Email:** ***jpinero@usbr.gov*** **OR Fax: (916) 414-2439**
  - **Mail:**

    Janice Piñero, Endangered Species Act Specialist
    Bureau of Reclamation, Bay-Delta Office
    801 I Street, Suite 140
    Sacramento, CA 95814-2536

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Scoping Meeting Guidelines

- Ensure everyone's participation
  - Meeting is structured to give everyone an opportunity to participate
- Respect each other's comments
  - Listen carefully to other participants
  - Place cell phones/pagers on vibrate and silent mode
- Honor time limits
  - Please keep comments concise so everyone has an opportunity to speak
- Identify yourself and your affiliation
  - This will help the transcriber, Reclamation staff, and the audience

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Guidelines for Verbal Comments

- Fill out a Speaker Card and submit to facilitator
- Everyone will be heard
- Please be respectful
- Please limit comments to 3 minutes
- All comments will be recorded by a transcriber
- Please introduce yourself and affiliation to help the transcriber
- Reclamation is here to listen

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For More Information

- www.usbr.gov/mp/BayDeltaOffice
- Sign up to receive periodic electronic updates on sign-in sheet
- Provide comments throughout preparation of EIS

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Attachment D

Scoping Meeting Transcripts

Please see http://www.usbr.gov/mp/BayDeltaOffice/Documents/remand.html

Attachment E

Written Scoping Comments

Please see http://www.usbr.gov/mp/BayDeltaOffice/Documents/remand.html