Chapter 4.0 Errata

The following corrections and/or clarifications have been made to the Draft PEIS/R text. These include minor corrections to improve writing clarity, grammar, typographical errors, and consistency; and corrections or clarifications in accordance with specific responses to comments, as described in Chapter 3.0, "Individual Comments and Responses," of this Final PEIS/R. The text revisions are organized by the chapter, section, and page number that appear in the Draft PEIS/R. Deletions are indicated by strikethrough text (~~deleted text~~), and new text is indicated by underlined text (<u>new text</u>). Text, table, and figure revisions are itemized below.

Corrections and clarifications are organized according to the section, chapter, and appendices to which they apply, beginning with the Executive Summary.

The following correction is made throughout the Draft PEIS/R at the locations specified in Table 4-1. The terms "reoperate," "reoperating," and "reoperation," are revised to "operate," "operating," and "operation," respectively.

**Table 4-1.
Page and Line Number Locations of
Revisions of "Reoperate," "Reoperating," and "Reoperation"**

Document Section	Chapter / Section	Page	Line or Paragraph
Main	ES	5	1st bullet
Main	ES	20	Table ES-5, Row 1
Main	ES	21	Table ES-5, Row 3
Main	ES	22	1st bullet
Main	ES	22	1st bullet
Main	1	11	7
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Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)

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Main	2	1	20
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Main	2	5	Table 2-1, Row 2 Column 2
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Main	2	9	Table 2-2, Row 2 Column 1
Main	2	9	Table 2-2, Row 2 Column 2
Main	2	14	17
Main	2	14	18
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Main	4	19	Table 4-3, Row 2 Column 2
Main	4	34	13
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Main	4	36	13
Main	5	36	Table 5-2, Row 2 Column 2
Main	5	84	17
Main	5	84	21
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Main	5	84	25
Main	5	84	28
Main	5	84	36
Main	5	88	19
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Main	5	88	30
Main	5	89	6
Main	6	45	Table 6-4, Row 2 Column 2

**Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)**

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Main	6	81	17
Main	6	81	41
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Main	6	84	21
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Main	6	84	34
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Main	6	85	7
Main	6	85	10
Main	6	85	22
Main	6	85	23
Main	6	85	26
Main	6	85	27
Main	6	85	29
Main	6	86	28
Main	6	86	38
Main	6	87	15
Main	6	88	8
Main	6	88	10
Main	6	88	21
Main	6	88	22
Main	6	88	41
Main	6	89	30
Main	6	90	34
Main	6	92	39
Main	6	97	24
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**Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)**

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Main	6	104	17
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Main	7	16	Table 7-2, Row 2 Column 2
Main	7	29	18
Main	7	29	24
Main	8	13	Table 8-2, Row 2 Column 2
Main	8	23	14
Main	8	23	29
Main	8	23	40
Main	10	26	Table 10-7, Row 2 Column 2
Main	10	33	30
Main	10	37	3
Main	10	37	11
Main	10	37	14
Main	10	37	29
Main	10	40	9
Main	10	40	19
Main	10	40	21
Main	11	24	Table 11-3, Row 2 Column 2
Main	11	41	34
Main	11	41	36
Main	11	42	39
Main	11	50	26
Main	12	58	Table 12-14, Row 2 Column 2
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Main	12	67	7

Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)

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Main	12	69	Table 12-16, notes
Main	12	71	Table 12-17, notes
Main	12	73	Table 12-18, notes
Main	12	75	Table 12-19, notes
Main	12	92	Table 12-20, notes
Main	12	94	Table 12-21, notes
Main	12	96	Table 12-22, notes
Main	12	98	Table 12-23, notes
Main	13	71	Table 13-51, Row 2 Column 2
Main	13	79	6
Main	13	82	5
Main	14	12	Table 14-13, Row 2 Column 2
Main	16	26	Table 16-8, Row 2 Column 2
Main	16	39	39
Main	16	43	28
Main	16	43	30
Main	16	43	34
Main	16	43	36
Main	16	43	38
Main	16	44	10
Main	16	44	12
Main	16	44	17
Main	17	27	Table 17-13, Row 2 Column 2
Main	17	29	Table 17-14, Row 5 Column 1
Main	17	45	6
Main	17	45	6
Main	17	45	19
Main	17	45	25
Main	17	45	35
Main	17	46	4
Main	17	46	14
Main	18	8	Table 18-1, Row 2 Column 2
Main	18	12	4

**Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)**

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Main	19	15	Table 19-9, Row 2 Column 2
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Main	20	12	Table 20-4, Row 2 Column 2
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Main	20	25	24
Main	20	25	36
Main	20	26	5
Main	20	26	10
Main	20	26	16
Main	20	26	25
Main	20	27	6
Main	20	27	9
Main	20	27	21
Main	20	28	30
Main	20	29	1
Main	20	29	5
Main	21	22	Table 21-3, Row 2 Column 2
Main	21	37	23
Main	21	41	6
Main	21	41	6
Main	21	41	9
Main	21	41	12
Main	21	41	26
Main	21	41	30
Main	21	41	36
Main	21	42	10
Main	22	48	Table 22-26, Row 2 Column 2
Main	22	73	11
Main	22	73	18
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Main	22	75	7

**Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)**

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Main	22	75	25
Main	22	78	18
Main	23	13	Table 23-2, Row 2 Column 2
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Main	23	23	18
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Main	23	23	34
Main	23	23	39
Main	23	24	2
Main	23	24	8
Main	23	25	11
Main	23	25	30
Main	23	25	35
Main	23	27	15
Main	24	9	Table 24-1, Row 2 Column 2
Main	24	16	3
Main	24	27	11
Main	24	27	22
Main	24	27	28
Main	24	27	37
Main	24	28	13
Main	24	28	18
Main	24	28	23
Main	24	29	22
Main	24	29	31
Main	24	30	9
Main	24	30	15
Main	24	30	19
Main	24	30	27
Main	24	30	31
Main	24	30	33
Main	24	30	34

Table 4-1.
Page and Line Number Locations of Revisions of
“Reoperate,” “Reoperating,” and “Reoperation” (contd.)

Document Section	Chapter / Section	Page	Line or Paragraph
Main	24	30	40
Main	24	31	4
Main	24	31	23
Main	24	31	30
Main	24	31	33
Main	25	7	Table 25-1, Row 2 Column 2
Main	25	8	Table 25-2, Row 7 Column 1
Main	25	16	9
Main	25	16	9
Main	25	16	23
Main	25	16	32
Main	26	37	34
Main	26	43	6
Main	26	43	21
Main	26	43	36
Main	26	45	30
Main	26	48	13
Main	26	49	32
Main	26	58	15
Main	27	17	15
Main	27	18	33
Main	28	2	29
App G	ii	TOC	5
App G	1	1	23
App G	1	1	25
App G	1	1	31
App G	1	2	1
App G	1	2	10
App G	1	2	16
App G	3	1	23
App G	3	1	25
App G	3	6	18
App G	3	6	Figure 3-1, yellow section

**Table 4-1.
Page and Line Number Locations of Revisions of
"Reoperate," "Reoperating," and "Reoperation" (contd.)**

Document Section	Chapter / Section	Page	Line or Paragraph
App G	3	7	14
App G	3	8	1
App G	3	8	4
App G	3	9	4
App G	4	1	4
App G	4	1	11
App G	4	5	17
App G	4	5	18
App G	4	5	25
App G	4	8	3
App G	4	8	4
App G	4	8	5
App G	4	19	27
App G	4	19	32
App G	4	20	3
App G	4	20	13
App H	5	24	23
App H	5	25	2

4.1 Executive Summary

Page 7, Table ES-3:

**Table ES-3.
Site-Specific NEPA/CEQA Environmental Compliance
Documentation for SJRRP Actions Completed or In Progress**

Action	Description	NEPA/CEQA Environmental Compliance Document(s)	Lead Agency or Agencies
Install water level recorders	Install up to seven water level recorders in the San Joaquin River in Fresno and Madera counties to provide data related to hydrograph translation characteristics.	San Joaquin River Restoration Program Water Level Recorder Installation and Data Collection NOE. February 2009.	DWR (CEQA)
Install scour chains	Install scour chains in the San Joaquin River at locations in Fresno and Madera counties to provide data on sediment transport.	San Joaquin River Restoration Program Scour Chain Installation and Data Collection NOE. February 2009.	DWR (CEQA)
Install and rehabilitate stream gages	Rehabilitate and retrofit the existing stream gage stations at the Chowchilla Bypass Bifurcation Structure and below Sack Dam on the San Joaquin River, and install two new monitoring stations at the top of Reach 4B and one at the confluence of the Merced and San Joaquin rivers.	Installation and Rehabilitation of Stream Gages on the San Joaquin River, Fresno, Madera, and Merced Counties, California EA/FONSI. December 2008. Stream Gage Installation and Operation and Maintenance Project IS/MND. March 2009.	Reclamation (NEPA) and DWR (CEQA)
Sample stream bed sediment	Sample bed material at 20 locations to establish baseline data before release of Water Year 2010 Interim Flows.	San Joaquin River Restoration Program Stream Bed and Sand Sampling NOE. April 2009.	DWR (CEQA)
Seal the gates of the Chowchilla Bypass Bifurcation Structure	Install seals on the gates of the Chowchilla Bypass Bifurcation Structure to reduce or prevent flow from entering the sediment catchment basin downstream from the gates.	Chowchilla Bifurcation Structure Gate Seal Installation NOE. August 2009.	DWR (CEQA)
Release of Water Year 2010 Interim Flows	Implement provisions of the Settlement related to Water Year 2010 Interim Flows and to collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2010 Interim Flows Project EA/FONSI and IS/MND. September 2009.	Reclamation (NEPA) and DWR (CEQA)

**Table ES-3.
Site-Specific NEPA/CEQA Environmental Compliance
Documentation for SJRRP Actions Completed or In Progress (contd.)**

Action	Description	NEPA/CEQA Environmental Compliance Document(s)	Lead Agency or Agencies
Recirculation of recaptured Water Year 2010 Interim Flows	Implement provisions of the Settlement pertaining to the Water Management Goal for Water Year 2010 Interim Flows and to collect relevant data to guide future recirculation of Interim and Restoration flows.	Recirculation of Recaptured Water Year 2010 San Joaquin River Restoration Program Interim Flows EA/FONSI. February 2011.	Reclamation (NEPA)
Gather geotechnical data and install monitoring wells	Install groundwater monitoring wells adjacent to the San Joaquin River and collect geotechnical data through exploration holes at existing and potential new levees, control structures, river crossing structures, and test pits to identify possible borrow material.	Draft San Joaquin River Restoration Program Geotechnical Investigation and Seepage Well Installation Project IS/MND. October 2009.	DWR (CEQA)
Release Water Year 2011 Interim Flows	Implement provisions of the Settlement related to Water Year 2011 Interim Flows and collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2011 Interim Flows Project Supplemental EA/FONSI. September 2010.	Reclamation (NEPA)
Recirculation of recaptured Water Year 2011 Interim Flows	Implement provisions of the Settlement pertaining to the Water Management Goal for Water Year 2011 Interim Flows and to collect relevant data to guide future recirculation of Interim and Restoration flows.	Recirculation of Recaptured Water Year 2011 San Joaquin River Restoration Program Interim Flows EA/FONSI. June 2011.	Reclamation (NEPA)
Release Water Year 2012 Interim Flows	Implement provisions of the Settlement related to Water Year 2012 Interim Flows and collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2012 Interim Flows Project Supplemental EA/FONSI. September 2011.	Reclamation (NEPA)

Key:
CEQA = California Environmental Quality Act
DWR = California Department of Water Resources
EA/FONSI = Environmental Assessment/Finding of No Significant Impact
IS/MND = Initial Study/Mitigated Negative Declaration
NEPA = National Environmental Policy Act
NOE = Notice of Exemption
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
SJRRP = San Joaquin River Restoration Program

Page 9, Table ES-4:

Table ES-4.
Compliance, Consultation, and Coordination Supported By This Draft PEIS/R

Resource	Applicable Laws/Regulations/Permits	Regulating Agency/Agencies	Level of Compliance of Applicable Actions
All	San Joaquin River Restoration Settlement Act	Secretary of the Interior	Program and Project
Wetlands, Waters of the United States, and Federal Levees	Section 404 of the Clean Water Act – Individual or General Permit	U.S. Army Corps of Engineers	Program
	Section 10 of the Rivers and Harbors Act ~~Clean Water Act~~ – Individual or General Permit	U.S. Army Corps of Engineers	Program
Wetlands, Waters of the United States, and Federal Levees (contd.)	Section 14 of the Rivers and Harbors Act ~~Clean Water Act~~ ("Section 408") – Permission	U.S. Army Corps of Engineers	Program
	Section 401 of the Clean Water Act – Water Quality Certification or Waiver	Regional Water Quality Control Board	Program
	Section 402 of the Clean Water Act – National Pollutant Discharge Elimination System permit(s)	State Water Resources Control Board and Regional Water Quality Control Board	Program
	Porter-Cologne Water Quality Control Act	Regional Water Quality Control Board	Program
	Sections 1600 through 1607 of the California Fish and Game Code – Streambed Alteration Agreement	California Department of Fish and Game	Program
Federally Listed Species	Section 4(d) of the Federal Endangered Species Act – Issuance of regulations pertaining to reintroduction of Chinook salmon	National Marine Fisheries Service	Program
	Section 7 of the Federal Endangered Species Act – Section 7 Consultation	U.S. Fish and Wildlife Service and National Marine Fisheries Service	Program and Project
	Section 10(j) of the Federal Endangered Species Act – Section 10 permit	National Marine Fisheries Service	Program
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service	Program and Project
Fish and Wildlife Resources	Fish and Wildlife Coordination Act report	U.S. Fish and Wildlife Service	Program and Project
Cultural Resources	National Historic Preservation Act – Section 106 Consultation	State Historic Preservation Officer	Program and Project
State-Listed Species/State Special-Status Species	Section 2081 of the California Endangered Species Act – Incidental Take Permit/Consistency Determination	California Department of Fish and Game	Program and Project
	California Native Plant Protection Act	California Department of Fish and Game	Program and Project

**Table ES-4.
Compliance, Consultation, and Coordination Supported By This Draft PEIS/R
(contd.)**

Resource	Applicable Laws/Regulations/Permits	Regulating Agency/Agencies	Level of Compliance of Applicable Actions
Levees and Floodways	Central Valley Flood Protection Board Encroachment Permit and 33 Code of Federal Regulations 208.10 (U.S. Army Corps of Engineers review)	Central Valley Flood Protection Board and U.S. Army Corps of Engineers	Program
Water Rights	California Water Code – Water Right Petitions (including petitions for changes to Water Right Permits 11885, 11886, and 11887, and License 1986)	State Water Resources Control Board	Program and Project
State Lands	Land Use Lease	State Lands Commission	Program
Air Quality	Authority to Construct, Permit to Operate	San Joaquin Valley Air Pollution Control District	Program
State-Owned Roadways	Encroachment Permit	California Department of Transportation	Program
Surface Mining	California Surface Mining and Reclamation Act permit	California Surface Mining and Reclamation Act lead agencies and California Department of Conservation	Program

Page 20, Table ES-5:

Table ES-5.
NEPA/CEQA Level of Compliance for Actions Included Under Action Alternatives

Category	Action	Level of NEPA/CEQA Compliance
~~re~~Operate Friant Dam and Downstream Flow Control Structures	Release Interim and Restoration flows from Friant Dam up to full Restoration Flows stipulated by Settlement, as constrained by then-existing channel capacities	Project
	Minimize increases in flood risk in the Restoration Area due to release ~~as a result~~ of Interim and Restoration flows	
	~~Re~~Operate downstream flow control structures	
	Establish an RWA and manage Friant Dam to make water supplies available to Friant Division long-term contractors at a preestablished rate	
Recapture Interim and Restoration Flows	Recapture Interim and Restoration flows in Restoration Area at Mendota Pool and wildlife refuge	
	Recapture Interim and Restoration flows in Delta at existing CVP/SWP facilities	
	Recapture Interim and Restoration flows at existing facilities on San Joaquin River with potential in-district modifications to existing facilities	Program
	Construct and operate new pumping infrastructure on San Joaquin River	
Recirculate Recaptured Interim and Restoration Flows	Recirculate recaptured Interim and Restoration flows	
Common Restoration Actions	Construct Mendota Pool Bypass and modify Reach 2B to convey at least 4,500 cfs	Program
	Modify Reach 4B1 to convey at least 475 cfs	
	Modify San Joaquin River Headgate Structure to enable fish passage and flow routing	
	Modify Sand Slough Control Structure to enable fish passage	
	Screen Arroyo Canal and provide fish passage at Sack Dam	
	Modify Eastside and Mariposa Bypasses for fish passage	
	Enable deployment of seasonal barriers at Mud and Salt sloughs	
	Modify Chowchilla Bypass Bifurcation Structure	
	Fill or isolate gravel pits	
	Reintroduce salmon	
	Enhance spawning gravel	
	Reduce potential for redd superimposition and/or hybridization	
	Supplement the salmon population	
	Modify floodplain and side-channel habitat	
	Enhance in-channel habitat	
	Reduce potential for aquatic predation of juvenile salmonids	
	Reduce potential for fish entrainment	
	Enable fish passage	
	Modify flood flow control structures	

Table ES-5.
NEPA/CEQA Level of Compliance for Actions Included Under Action Alternatives (contd.)

Category	Action	Level of NEPA/CEQA Compliance
Actions in Reach 4B1 to Provide at Least 4,500 cfs Capacity	Modify Reach 4B1 to convey at least 4,500 cfs	Program
Physical Monitoring and Management Plan	Monitoring actions[1]	
	Immediate management actions	Project
	Long-term management actions	Program
Conservation Strategy	Various conservation measures, applied to actions above	Project and Program

Note:
[1] Site-specific documentation has been prepared for monitoring actions completed or currently underway, and would be prepared, as necessary, for actions described at a program-level of detail in this Draft PEIS/R.

Key:
CEQA = California Environmental Quality Act
cfs = cubic feet per second
CVP = Central Valley Project
Delta = Sacramento-San Joaquin Delta
NEPA = National Environmental Policy Act
PEIS/R = Program Environmental Impact Statement/Report
Restoration Area = San Joaquin River from Friant Dam to the Merced river confluence
RWA = Recovered Water Account
Settlement = Stipulation of Settlement, *NRDC et al., v. Kirk Rodgers, et al*.
SWP = State Water Project

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- **Release Interim and Restoration flows –** The release of Interim and Restoration flows from Friant Dam includes an annual allocation of Interim and Restoration flows using either the Restoration Flow schedules, as included in Exhibit B of the Settlement, or a more continuous hydrograph, as shown in Figure ES-5, and includes applying the following provisions to modify Restoration Flows, in consideration of recommendations to be made by the RA: application of flexible flow periods, as described in Exhibit B of the Settlement; the use of up to an additional 10 percent buffer flow to help meet the Restoration Goal; and the release of acquired water for unanticipated river seepage losses for Restoration Flows. According to Paragraph 13(i), the RA is responsible for recommending to the Secretary the date for commencing full Restoration Flows in consideration of the completion of Phase 1 improvements. If, for any reason, full Restoration Flows are not released in any year beginning January 1, 2014, the Secretary, in consultation with the RA, would bank, store, exchange, transfer, or sell the water through mutually acceptable agreements with Friant Division long-term contractors or third parties (with proceeds deposited into the Restoration Fund established under the Settlement), or release the water from Friant Dam during times of the year other than those specified in the applicable hydrograph.

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Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights~~"~~ (Contract I1r-1145, dated July 27, 1939)."

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»**Recapture in the Restoration Area –** ~~If necessary to avoid interfering with in-channel construction activities associated with the Restoration Goal, or to avoid potential material adverse impacts from groundwater seepage, or for other emergency actions to avoid immediate adverse impacts,~~ Interim and Restoration flows ~~w~~could be recaptured at existing diversion points in the Restoration Area, including the Mendota Pool and Arroyo Canal, the Lone Tree Unit of the Merced National Wildlife Refuge (Lone Tree Unit) located in Eastside Bypass Reach 2, and the East Bear Creek Unit of the San Luis National Wildlife Refuge (East Bear Creek Unit) located in Eastside Bypass Reach 3. In the event that recapture within the Restoration Area would prevent the flow targets from being met, recapture within the Restoration Area would occur only if necessary to avoid interfering with in-channel construction activities associated with the Restoration Goal, to avoid potential material adverse impacts from groundwater seepage, or for other emergency actions to avoid immediate adverse impacts. Interim and Restoration flows recaptured in the Restoration Area could provide deliveries in lieu of DMC supplies. Delta water, up to the amount diverted at these locations, would be available for recirculation to the Friant Division using existing south-of-Delta facilities, subject to available capacity and then-existing operational constraints within CVP/SWP storage and conveyance facilities.

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- **Flow Monitoring and Management Component Plan –** To ensure compliance with the hydrograph releases, flow targets, and any other applicable flow releases (e.g., Buffer Flows) in Exhibit B of the Settlement ~~and any other applicable flow releases (e.g., Buffer Flows)~~

Pages 30-36, Table ES-6:

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
VP	**Vernal pool habitats, fleshy (succulent) owl's clover, Hoover's spurge, Bogg's Lake hedge-hyssop, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and western spadefoot toad**		
VP-1. Avoid effects to species	a) If vernal pools or vernal pool species are anticipated within a project area, a qualified biologist will identify and map vernal pool and seasonal wetland habitat potentially suitable for listed vernal pool plants, invertebrates, and western spadefoot toad within the project footprint. b) Facility construction and other ground-disturbing activities will be sited to avoid core areas identified in the *Vernal Pool Recovery Plan* (USFWS 2005) because conservation of these areas is a high priority for recovering listed vernal pool species.	Project and Program	USFWS DFG
VP-2. Minimize effects to species	a) If vernal pools are present, a buffer around the microwatershed or a 250-foot-wide buffer, whichever is greater, will be established before ground-disturbing activities around the perimeter of vernal pools and seasonal wetlands that provide suitable habitat for vernal pool crustaceans or vernal pool plants. This buffer will remain until ground-disturbing activities in that area are completed. Suitable habitat and buffer areas will be clearly identified in the field by staking, flagging, or fencing. b) Appropriate fencing will be placed and maintained around all preserved vernal pool habitat buffers during ground-disturbing activities to prevent impacts from vehicles and other construction equipment. c) Worker awareness training and on-site biological monitoring will occur during ground-disturbing activities to ensure buffer areas are being maintained.	Program	Lead Agency

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
VP-3. Compensate for temporary or permanent loss of habitat	a) If activities occur within the microwatershed or 250-foot-wide buffer for vernal pool habitat will be affected by the SJRRP, the project proponent will develop and implement a compensatory mitigation plan, consistent with the USACE and EPA April 10, 2008, Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332 and 40 CFR Part 230) and other applicable regulations and rules at the time of implementation, that will result in no net loss of acreage, function, and value of affected vernal pool habitat. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of vernal pool habitat or purchase of credits at a mitigation bank approved by the applicable regulatory agency/agencies. b) Project effects and compensation will be determined in consideration of the *Vernal Pool Recovery Plan* goals for core areas, which call for 95 percent preservation for habitat in the Grasslands Ecological Area and Madera core areas, and 85 percent habitat preservation in the Fresno core area (USFWS 2005). c) Appropriate compensatory ratios for loss of habitat both in and out of core areas will be determined during coordination and consultation with USFWS and/or DFG, as appropriate. d) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be ~~and~~ developed as part of the USFWS and/or DFG coordination and consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase will require an endowment for land management in perpetuity before any project groundbreaking activities.	Project and Program	USFWS DFG
CH	**Critical habitat**		
CH-1. Avoid and minimize effects to critical habitat	a) Designated critical habitats shall be identified and mapped. b) All SJRRP actions will be designed to avoid direct and indirect adverse modifications to these areas. c) Minimization measures, such as establishing and maintaining buffers around areas of designated critical habitat, shall be implemented if avoidance is not feasible.	Project and Program	USFWS
CH-2. Compensate for unavoidable adverse effects on Federally designated critical habitat	a) If critical habitat may be adversely modified by the implementation of SJRRP actions, the area to be modified will be evaluated by a qualified biologist to determine the potential magnitude of the project effects (i.e., description of primary constituent elements present and quantification of those affected) at a level of detail necessary to satisfy applicable environmental compliance and permitting requirements. b) Compensatory conservation measures developed through Section 7 consultation with USFWS will be implemented. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS consultation process. The plan will include information on responsible	Project and Program	USFWS

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
	parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase require an endowment for land management in perpetuity before any project groundbreaking activities.		
CTS	**California tiger salamander**		
CTS-1. Avoid and minimize effects to species	a) If potential California tiger salamander habitat or species are anticipated within the project area, within 1 year before project construction activities, a qualified biologist shall identify and map potential California tiger salamander habitat (areas within 1.3 miles of known or potential California tiger salamander breeding habitat) within the project footprint. One week before ground-disturbing activities, a qualified biologist will survey for and flag the presence of ground squirrel and gopher burrow complexes. Where burrow complexes are present, a 250-foot-wide buffer shall be placed to avoid and minimize disturbance to the species. b) Facility construction and other ground-disturbing activities shall be sited to avoid areas of known California tiger salamander habitat and avoidance buffers. c) To eliminate an attraction to predators of the California tiger salamander, all food-related trash items such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once every day from the entire project site.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CTS-2. Minimize effects to species	a) Before and during construction activities, construction exclusion fencing will be installed just outside the work limit or around vernal pools where California tiger salamander may occur. This fencing shall be maintained throughout construction and will be removed at the conclusion of ground-disturbing activities. No vehicles will be allowed beyond the exclusion fencing. A USFWS- and DFG-approved biological monitor shall be present on site, during intervals recommended by USFWS and DFG, to inspect the fencing. b) The biological monitor will be on site each day during any wetland restoration or construction, and during initial site grading or development of sites where California tiger salamanders have been found. c) Before the start of work each day, the biological monitor will check for animals under any equipment to be used that day, such as vehicles or stockpiles of items such as pipes. If California tiger salamanders are present, they will be allowed to leave on their own, before the initiation of construction activities for the day. To prevent inadvertent entrapment of California tiger salamanders during construction, all excavated, steep-walled holes or trenches more than 1 foot deep shall be covered, by plywood or similar materials, at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. d) Plastic monofilament netting (erosion control matting) or similar material shall not be used at the project site because California tiger salamanders may become entangled or trapped. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds. e) All ground-disturbing work shall occur during daylight hours. Clearing and grading will be conducted between April 15 and October 15, in coordination with USFWS and DFG, and depending on the level of rainfall and site conditions. f) Revegetation of project areas temporarily disturbed by construction activities will be conducted with locally occurring native plants.	Program	USFWS DFG
CTS-3. Compensate for temporary or permanent loss of habitat	a) If California tiger salamander, or areas within 1.3 miles of known or potential California tiger salamander breeding habitat, would be affected by the SJRRP, the project proponent will develop and implement a compensatory mitigation plan in coordination with USFWS and DFG, as appropriate. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of habitat or purchase of credits at a mitigation bank approved by the regulatory agencies. b) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS and/or DFG coordination and consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase will require an endowment for land management in perpetuity before any project groundbreaking activities.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
DBC	**Delta button-celery**		
DBC-1. Avoid and minimize loss of habitat and individuals	a) Historically, Delta button-celery was known to exist in the Eastside and Mariposa bypasses (CNDDB). In most areas of the bypasses, local flows up to 1,500 cfs remain in the main channel, and do not inundate the floodplain. Maintaining flows at or below 1,500 will not impact Delta button celery populations. In general, historical Delta button celery populations have been located below the 2,500 cfs inundation area (CNDDB). If these historical populations are still thriving in these areas, flows between 1,500 cfs and 2,500 cfs will most likely impact these populations. Potential areas of impact within the Eastside Bypass from the Sand Slough Bypass to the Mariposa Bypass are approximately 400 acres, and for the Mariposa Bypass, approximately 100 acres. Before increasing flows above 1,500 cfs in these specific areas, comprehensive surveys will be conducted.Surveys will include remapping and recensus of the documented occurrences during at least 2 consecutive or nonconsecutive years when habitat conditions are favorable to detect the species to determine the population trend. Status updates for these occurrences will be provided to DFG. b) A Delta button-celery conservation plan will be developed and implemented that includes a preservation and adaptive management strategy for existing occurrences within the Restoration Area. The conservation plan will be developed in collaboration with DFG and other species experts, and be supported by review of the existing literature, including information on species' life history characteristics, historic and current distribution, and microhabitat requirements.	Project and Program	DFG
DBC-2. Avoid and minimize loss of habitat and risk of take for implementation of construction activities	a) If direct impacts to Delta button celery could occur, DFG and the appropriate State lead agency will coordinate to determine specific minimization and mitigation measures	Program	Lead Agency

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
DBC-3. Compensate for temporary or permanent loss of habitat	a) Compensatory mitigation for Delta button-celery will be developed in consultation with DFG. Mitigation may include the development and implementation of habitat creation and enhancement designs to incorporate habitat features for Delta button-celery (e.g., depressions within seasonally inundated areas) into floodplains with potentially suitable habitat conditions. Compensatory mitigation may also include efforts to establish additional populations in the Restoration Area or to enhance existing populations on or off site. Mitigation sites will avoid areas where future SJRRP activities are likely. The project proponent will obtain site access through a conservation easement or in-lieu fee title and will provide adequate funding to implement the required compensation measures, and to monitor compliance with and success of the conservation measures. b) Establishment of new occurrences will be attempted by transplanting seed and plants from affected locations to created habitat or suitable, but unoccupied, existing habitat. c) Monitoring, performance criteria, and protective measures will be applied to compensatory mitigation sites. The replacement requirements, and any additional conservation and mitigation measures will be determined in coordination with DFG.	Project and Program	DFG
PALM	**Palmate-bracted bird's beak**		
PALM-1. Avoid and minimize effects to species	a) If palmate-bracted bird's beak is anticipated within the project area, a qualified botanist will identify and map the location of palmate-bracted bird's beak plants within the project footprint, within 1 year before the start of activities that may cause disturbance from either release of flows over 1,660 cfs or from ground-disturbing actions. b) A minimum 500-foot-wide buffer shall be placed around occurrences of palmate-bracted bird's beak during construction activities, consistent with recommendations in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The 500-foot-wide buffer will be clearly identified in the field by staking, flagging, or fencing. Project activity will avoid buffer areas, and work awareness training and biological monitoring will be conducted to ensure that the buffer area is not encroached on and that effects are being avoided.	Project and Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PALM-2. Compensate for temporary or permanent loss of occupied habitat	a) A compensatory conservation plan shall be developed in coordination with USFWS and DFG, as appropriate. The conservation plan will require the project proponent to maintain viable plant populations in the Restoration Area and will identify compensatory measures for any populations affected. The conservation plan shall include monitoring and reporting requirements for populations to be preserved in or adjacent to construction areas, or populations to be protected or enhanced off site. b) If relocation efforts are part of the conservation plan, the plan will include details on the methods to be used: collection, relocation/transplant potential, storage, propagation, preparation of receptor site, installation, long-term protection and management, monitoring and reporting requirements, and remedial action responsibilities should the initial effort fail to meet compensation requirements. c) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the conservation plan and must occur with full endowment for management in perpetuity before groundbreaking. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Project and Program	USFWS DFG
VELB	**Valley elderberry longhorn beetle**		
VELB-1. Avoid and minimize effects to species	a) If elderberry shrubs and valley elderberry longhorn beetle are anticipated within the project area, within 1 year before the commencement of ground-disturbing activities, a qualified biologist shall identify any elderberry shrubs in the project footprint. Qualified biologist(s) will survey potentially affected shrubs for valley elderberry longhorn beetle exit holes in stems greater than 1 inch in diameter. b) If elderberry shrubs are found on or adjacent to the construction project site, a 100-foot-wide avoidance buffer – measured from the dripline of the plant – will be established around all elderberry shrubs with stems greater than 1 inch in diameter at ground level and will be clearly identified in the field by staking, flagging, or fencing. No activities will occur within the buffer areas and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Project and Program	USFWS

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
BNLL	**Blunt-nosed leopard lizard**		
VELB -2. Compensate for temporary or permanent loss of habitat	a) The project proponent will consult with USFWS to determine appropriate compensation ratios. Compensatory mitigation measures will be consistent with the *Conservation Guidelines for Valley Elderberry Longhorn Beetle* (USFWS 1999a), or current guidance. b) Compensatory mitigation for adverse effects may include transplanting elderberry shrubs during the dormant season (November 1 to February 15), if feasible, to an area protected in perpetuity, as well as required additional elderberry and associated native plantings and approved by USFWS. c) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Project and Program	USFWS
BNLL-1. Avoid and minimize effects to species	a) Three areas have been identified as having potential blunt-nosed leopard lizard habitat based on aerial maps. These areas include approximately 2,460 acres along the southwest side of the San Joaquin River in Reach 2, approximately 490 acres in a portion of the Eastside Bypass and adjacent lands near Reach 4A of the San Joaquin River, and approximately 2,938 acres encompassing the northern side of the Mariposa Bypass and parcels north of the Mariposa Bypass and west of the Eastside Bypass. Within 1 year before the commencement of the proposed project, focused site visits and habitat assessment will be conducted on these lands. Based on focused assessment, and discussions with the USFWS and DFG, protocol-level surveys may be conducted. If blunt-nosed leopard lizard are detected within or adjacent to the project site, measures that will avoid direct take of this species will be developed in cooperation with USFWS and DFG and implemented before ground disturbing activities. ~~(DWR 2010).~~	Project and Program	USFWS DFG
BNLL-2. Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with USFWS and DFG as appropriate.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PLANTS	**Other special-status plants**		
PLANTS-1. Avoid and minimize effects to special-status plants	a) Within 1 year before the commencement of ground-disturbing activities, habitat assessment surveys for the special-status plants listed in Table 1 of Appendix L of this Draft PEIS/R, "Biological Resources – Vegetation and Wildlife," will be conducted by a qualified botanist, in accordance with the most recent USFWS and DFG guidelines and at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. b) Locations of special-status plant populations will be clearly identified in the field by staking, flagging, or fencing a minimum 100-foot-wide buffer around them before the commencement of activities that may cause disturbance. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. c) Some special-status plant species are annual plants, meaning that a plant completes its entire life cycle in one growing season. Other special-status plant species are perennial plants that return year after year until they reach full maturity. Because of the differences in plant life histories, all general conservation measures will be developed on a case-by-case basis and will include strategies that are species- and site-specific to avoid impacts to special-status plants.	Program	USFWS DFG
PLANTS-2. Compensate for temporary or permanent loss of special-status plants	a) USFWS and/or DFG will be consulted to determine appropriate compensation measures for the loss of special-status plants, as appropriate. b) Appropriate mitigation measures may include the creation of off-site populations through seed collection or transplanting, preservation and enhancement of existing populations, restoration or creation of suitable habitat, or the purchase of credits at a regulatory-agency-approved mitigation bank. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
GGS	**Giant garter snake**		
GGS-1. Avoid and minimize loss of habitat for giant garter snake	a) If giant garter snake habitat is anticipated to be present within the project area, preconstruction surveys will be completed by a qualified biologist approved by USFWS and DFG within a 24-hour period before any ground disturbance of potential giant garter snake habitat. If construction activities stop on the project site for a period of 2 weeks or more, a new giant garter snake survey will be completed no more than 24 hours before the restart of construction activities. Avoidance of suitable giant garter snake habitat, as defined by USFWS (USFWS 1993) and DFG, will occur by demarcating and maintaining a 300-foot-wide buffer around these areas. b) For projects within potential giant garter snake habitat, all activity involving disturbance of potential giant garter snake habitat will be restricted to the period between May 1 and October 1, the active season for giant garter snakes. The construction site shall be reinspected if a lapse in construction activity of 2 weeks or greater has occurred. c) Clearing will be confined to the minimal area necessary to facilitate construction activities. Giant garter snake habitat within or adjacent to the project will be flagged, staked, or fenced and designated as an Environmentally Sensitive Area. No activity shall occur within this area, and USFWS-approved worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. Construction activities shall be minimized within 200 feet of the banks of giant garter snake habitat. Movement of heavy equipment will be confined to existing roadways to minimize habitat disturbance. d) Vegetation shall be hand-cleared in areas where giant garter snakes are suspected to occur. Exclusionary fencing with one-way exit funnels shall be installed at least 1 month before activities to allow the species to passively leave the area and to prevent reentry into work zones, per USFWS and/or DFG guidance. e) If a giant garter snake is found during construction activities, USFWS, DFG, and the project's biological monitor will immediately be notified. The biological monitor, or his/her assignee, will stop construction in the vicinity of the find and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed. Escape routes for giant garter snake should be determined in advance of construction and snakes will be allowed to leave on their own. If a giant garter snake does not leave on its own within 1 working day, USFWS and DFG will be consulted. f) All construction-related holes shall be covered to prevent entrapment of individuals. Where applicable, construction areas shall be dewatered 2 weeks before the start of activities to allow giant garter snakes and their prey to move out of the area before any disturbance.	Program	Lead Agency USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
GGS-2. Compensate for temporary or permanent loss of habitat	a) Temporarily affected giant garter snake aquatic habitat will be restored in accordance with criteria listed in the USFWS *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat* (Appendix A to Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake Within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California (USFWS 1997)), or the most current criteria from USFWS or DFG. b) Permanent loss of giant garter snake habitat will be compensated at a ratio and in a manner consulted on with USFWS and DFG. Compensation may include preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at a regulatory-agency-approved mitigation bank in sufficient quantity to compensate for the effect. Credit purchases, land preservation, or land enhancement to minimize effects to giant garter snakes should occur geographically close to the impact area. If off-site compensation is chosen, it shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	USFWS DFG
WPT	**Western pond turtle**		
WPT-1. Avoid and minimize loss of individuals	a) A qualified biologist will conduct surveys in aquatic habitats to be dewatered and/or filled during project construction. Surveys will be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If western pond turtles are found, the biologist will capture them and move them to nearby USFWS- and/or DFG-approved areas of suitable habitat that will not be disturbed by project construction.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EAGLE	**Bald eagle and golden eagle**		
EAGLE-1. Avoid and minimize effects to bald and golden eagles (as defined in the Bald and Golden Eagle Protection Act)	a) Surveys for bald and golden eagle nests will be conducted within 2 miles of any proposed project within areas supporting suitable nesting habitat and important eagle roost sites and foraging areas. These surveys will be conducted in accordance with the USFWS *Protocol for Evaluating Bald Eagle Habitat and Populations in California* and DFG *Bald Eagle Breeding Survey Instructions* or current guidance (*USFWS Draft Project Design Criteria and Guidance for Bald and Golden Eagles)*. b) If an active eagle's nest is found, project disturbance will not occur within ½ mile of the active nest site during the breeding season (typically December 30 to July 1) or any project disturbance if it is shown to disturb the nesting birds. A no-disturbance buffer will be established around the nest site for construction activities in consultation with USFWS and DFG, and will depend on ecological factors, including topography, surrounding vegetation, nest height, and distance to foraging habitat, as well as the type and magnitude of disturbance. c) Project activity will not occur within the ½-mile-buffer areas, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	USFWS DFG
SWH	**Swainson's hawk**		
SWH-1. Avoid and minimize impacts to Swainson's Hawk	a) Preconstruction surveys for active Swainson's hawk nests will be conducted in and around all potential nest trees within 0.5 miles of project-related disturbance (including construction-related traffic).~~.~~ These surveys will be conducted in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000) or current guidance. b) If known or active nests are identified through preconstruction surveys or other means, a ½ mile no-disturbance buffer shall be established around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). c) Worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SWH-2. Compensate for loss of nest trees and foraging habitat	a) If foraging habitat for Swainson's hawk is removed in association with project implementation, foraging habitat compensation will occur in coordination with DFG. Foraging habitat mitigation may consist of planting and establishing alfalfa, row crops, pasture, or fallow fields. b) If potential nesting trees are to be removed during construction activities, removal will take place outside of Swainson's hawk nesting season, and the project proponent will develop a plan to replace known Swainson's hawk nest trees with a number of equivalent native trees that were previously determined to be impacts through consultation with DFG. Compensation shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	DFG
RAPTOR	**Other nesting raptors**		
RAPTOR-1. Avoid and minimize loss of individual raptors	a) Construction activity, including vegetation removal, will only occur outside the typical breeding season for raptors (September 16 to December 31~~February 14~~), if raptors are determined to be present. b) Preconstruction surveys will be conducted by a qualified biologist in areas of suitable habitat to identify active nests in the project footprint. c) If active nests are located in the project footprint, a no-disturbance buffer will be established until a qualified biologist determines that the nest is no longer active. The size of the buffer shall be established by a qualified biologist in coordination with DFG based on the sensitivity of the resource, the type of disturbance activity, and nesting stage. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	DFG
RAPTOR-2. Compensate for loss of nest trees	a) Native trees removed during project activities will be replaced with an appropriate number of native trees, in coordination with DFG.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
RNB	**Riparian Nesting Birds: Western Yellow-Billed Cuckoo, Least Bell's Vireo, and Willow Flycatcher**		
RNB-1. Avoid effects to species for implementation of the SJRRP	a) If western yellow-billed cuckoo, least Bell's vireo, or willow flycatcher (*Expidonax traillii ssp*.) are anticipated within a project area, a qualified biologist shall make an initial site visit to determine if suitable habitat for the species may exist within the project footprint. b) Where suitable habitat may be present, reconnaissance-level surveys would be conducted by biologists adhering to guidance offered in Halterman et al, May 2009, *Western Yellow-billed Cuckoo Natural History Summary and Survey Methodology*; and *Least Bell's Vireo Survey Guidelines*, USFWS, January 19, 2001; or Bombay et al, May 29, 2003 for willow flycatcher.	Project & Program	USFWS and DFG
RNB-2. Avoid, minimize, and compensate for effects to species for implementation of the SJRRP	a) If western yellow-billed cuckoo, least Bell's vireo, or willow flycatcher are detected or suspected to be present in the project footprint, information would be collected according to the guidelines stated in RNB-1(b). USFWS and DFG would be contacted to determine the approach for avoidance, minimization, or compensation.	Project & Program	USFWS and DFG
MBTA	**Other birds protected by the Migratory Bird Treaty Act**		
MBTA-1. Avoid and minimize effects to species	a) Native nesting birds will be avoided by not conducting project activity, including vegetation removal, during the typical breeding season (February 1 to September 1), if species covered under the Migratory Bird Treaty Act and Fish and Game Code Sections 3503, 3503.5, and 3513 are determined to be present. b) An Avian Protection Plan shall be established in coordination with USFWS and DFG. Any overhead utility companies within the project area, whose lines, poles, or towers may be moved in association with the project, will also be consulted as part of the Avian Protection Plan.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
BRO	**Burrowing owl**		
BRO-1. Avoid loss of species	a) Preconstruction surveys for burrowing owls will be conducted in areas supporting potentially suitable habitat and within 30 days before the start of construction activities. If ground-disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed. These surveys and mitigation will be conducted in accordance with the *Burrowing Owl Survey Protocol and Mitigation Guidelines*, (The California Burrowing Owl Consortium, 1993) or current guidance. b) Occupied burrows shall not be disturbed during the breeding season (February 1 through August 31). A minimum 160-foot-wide buffer shall be placed around occupied burrows during the nonbreeding season (September 1 through January 31), and a 250-foot-wide buffer shall be placed around occupied burrows during the breeding season. Ground-disturbing activities shall not occur within the designated buffers.	Program	DFG
BRO-2. Minimize impacts to species	a) If a DFG-approved biologist can verify through noninvasive methods that owls have not begun egg-laying and incubation, or that juveniles from occupied burrows are foraging independently and are capable of independent survival, a plan shall be coordinated with DFG to offset burrow habitat and foraging areas on the project site if burrows and foraging areas are taken by SJRRP actions. Mitigation measures will be consistent with the *Staff Report on Burrowing Owl Mitigation* (DFG 2012), or current guidance. b) If destruction of occupied burrows occurs, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created. This should be done in consultation with DFG. c) Passive owl relocation techniques must be implemented. Owls should be excluded from burrows in the immediate impact zone within a 160-foot-wide buffer zone by installing one-way doors in burrow entrances. These doors shall be in place at least 48 hours before excavation to insure the owls have departed. d) The project area shall be monitored daily for 1 week to confirm owl departure from burrows before any ground-disturbing activities. e) Where possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
BAT	**Special-status bats**		
BAT-1. Avoid and minimize loss of species	a) If suitable roosting habitat for special-status bats will be affected by project construction (e.g., removal of buildings, modification of bridges), surveys for roosting bats on the project site will be conducted by a qualified biologist. The type of survey will depend on the condition of the potential roosting habitat and may include visual surveys or use of acoustic detectors. Visual surveys may consist of a daytime pedestrian survey for evidence of bat use (e.g., guano) and/or an evening emergence survey for the presence or absence of bats <u>and will include trees within ¼ mile of project construction activities</u>. The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required. b) If evidence of bat use is observed, the number and species of bats using the roost will be determined. Bat detectors may be used to supplement survey efforts. c) If roosts are determined to be present and must be removed, the bats will be excluded from the roosting site before the facility is removed. A mitigation program addressing compensation, exclusion methods, and roost removal procedures will be developed in consultation with DFG before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when a site can be confirmed to contain no bats. Exclusion efforts may be restricted during periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).	Program	DFG
BAT-2. Compensate for loss of habitat	a) The loss of each roost will be replaced, in consultation with DFG, and may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. Roost replacement will be implemented before bats are excluded from the original roost sites. Once the replacement roosts are constructed and it is confirmed that bats are not present in the original roost sites, the structure may be removed.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SJAS	**San Joaquin antelope squirrel**		
SJAS-1. Avoid and minimize loss of individuals	a) A 50-foot-wide minimum buffer shall be maintained from all small mammal burrows of suitable size for San Joaquin antelope squirrel. b) If work is to occur within the 50-foot-wide buffer, a qualified, permitted biologist shall conduct focused visual surveys for San Joaquin antelope squirrel within a 500-foot-wide buffer of the work area. These surveys shall coincide with the squirrels' most active season, April 1 to September 30, and shall be conducted only when air temperatures are between 20° to 30° C (68° to 86° F). Surveys should be conducted using daytime line transects with 10- to 30-meter spacing. Focused live trapping may also be required, in coordination with DFG. If San Joaquin antelope squirrels are observed during surveys, no vegetation or soil disturbance will be allowed within 50 feet of occupied burrows or burrow systems until the individuals are determined to no longer be occupying the area, as determined by a qualified biologist. c) Focused surveys, which may involve live trapping, may be required, in coordination with DFG, as appropriate. Additional conservation measures may be developed pending the results of surveys, and in consultation with DFG. d) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season). This timing shall be coordinated with USFWS and DFG.	Program	DFG
SJAS-2: Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with DFG, as appropriate.	Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
FKR	**Fresno kangaroo rat**		
FKR-1. Avoid and minimize effects to species	a) Preconstruction surveys will be conducted by a qualified biologist per USFWS and DFG survey methodology to determine if potential burrows for Fresno kangaroo rat are present in the project footprint. Surveys will be conducted within 30 days before ground-disturbing activities. The biologist will conduct burrow searches by systematically walking transects, which shall be adjusted based on vegetation height and topography, and in coordination with USFWS and DFG. Transects shall be used to identify the presence of kangaroo rat burrows. When burrows are found within 100 feet of the proposed project footprint, focused live trapping surveys shall be conducted by a qualified and permitted biologist, following a methodology approved in advance by USFWS and DFG. Additional conservation measures may be developed pending the results of surveys, and in consultation with USFWS and DFG. b) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December through September (Ahlborn 1999)). This timing shall be coordinated with USFWS and DFG.	Program	USFWS DFG
FKR-2. Avoid disturbance of designated critical habitat	a) Facility construction and modification and other restoration projects shall be sited to avoid primary constituent elements of designated critical habitat for Fresno kangaroo rat.	Program	USFWS DFG
FKR-3: Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with DFG and USFWS, as appropriate.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SJKF	**San Joaquin kit fox**		
SJKF-1. Avoid and minimize effects to species	a) A qualified biologist will conduct preconstruction surveys no less than 14 days and no more than 30 days before the commencement of activities to identify potential dens more than 5 inches in diameter. The project proponent shall implement USFWS' (1999b) *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance.* The project proponent will notify USFWS and DFG in writing of the results of the preconstruction survey within 30 days after these activities are completed. b) If dens are located within the proposed work area, and cannot be avoided during construction activities, a USFWS-approved biologist will determine if the dens are occupied. c) If occupied dens are present within the proposed work, their disturbance and destruction shall be avoided. Exclusion zones will be implemented following the latest USFWS procedures (currently USFWS 1999b). d) The project proponent will notify USFWS and DFG immediately if a natal or pupping den is found in the survey area. The project proponent will present the results of preactivity den searches within 5 days after these activities are completed and before the start of construction activities in the area. e) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December–April (Ahlborn 2000)). This timing shall be coordinated with USFWS and DFG.	Program	USFWS DFG
SJKF-2. Compensate for loss of habitat	a) The project proponent, in coordination with USFWS and DFG, will determine if kit fox den removal is appropriate. If unoccupied dens need to be removed, the USFWS-approved biologist shall remove these dens by hand-excavating them in accordance with USFWS procedures (USFWS 1999b). b) Additional conservation measures will be coordinated with USFWS and DFG, and may include replacing dens, installing off-site artificial dens, acquiring compensation habitat, or other options to be determined. Compensation may include dedicating conservation easements, purchasing mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. c) The project proponent will present the results of den excavations to USFWS and DFG within 5 days after these activities are completed.	Program	USFWS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PL	**Pacific lamprey**		
PL-1. Avoid and minimize effects to species	a) A qualified biologist will conduct preconstruction surveys as outlined in Attachment A of USFWS' *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus)* (2010). b) Work in documented areas of Pacific lamprey presence will be timed to avoid in-channel work during typical lamprey spawning (March 1 to July 1). c) If temporary dewatering in documented areas of lamprey presence is required for instream channel work, salvage methods shall be implemented to capture and move ammocoetes to a safe area, in consultation with USFWS.	Program	USFWS
DS	**Delta smelt**		
DS-1. Avoid and minimize effects to species	a) All in-water work within delta smelt habitat, as defined by most recent USFWS guidance, shall be confined to a seasonal work window of August 1 - November 30, when delta smelt are least likely to be present. Because this species does not regulate its movements strictly within this time frame, modifications to the work windows may be approved by USFWS before project implementation, based on information from the various in-Delta monitoring programs. b) If activities occur within ~~D~~delta smelt habitat, measure will be taken to maintain or increase shading of suitable shallow water habitat. The project will also avoid areas deemed suitable for delta smelt habitat that have established aquatic vegetation or have not been previously disturbed.	Program	USFWS DFG
RHSNC	**Riparian habitat and other sensitive natural communities**		
RHSNC-1. Avoid and minimize loss of riparian habitat and other sensitive natural communities	a) Biological surveys will be conducted to identify, map, and quantify riparian and other sensitive habitats in potential construction areas. b) Construction activities will be avoided in areas containing sensitive natural communities, as appropriate. c) If effects occur to riparian habitat, emergent wetland, or other sensitive natural communities associated with streams, the State lead agency will comply with Section 1602 of the California Fish and Game Code; compliance may include measures to protect fish and wildlife resources during the project.	Project and Program	DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
RHSNC-2. Compensate for loss of riparian habitat and other sensitive natural communities	a) The Riparian Habitat Mitigation and Monitoring Plan for the SJRRP will be developed and implemented in coordination with DFG. Credits for increased acreage or improved ecological function or riparian and wetland habitats resulting from the implementation of SJRRP actions will be applied as compensatory mitigation before additional compensatory measures are required. b) If losses of other sensitive natural communities (e.g., recognized as sensitive by CNDDB, but not protected under other regulations or policies) would not be offset by the benefits of the SJRRP, then additional compensation will be provided through creating, restoring, or preserving in perpetuity in-kind communities at a sufficient ratio for no net loss of habitat function or acreage. The appropriate ratio will be determined in consultation with USFWS or DFG, depending on agency jurisdiction.	Project and Program	DFG
WUS	**Waters of the United States/waters of the State**		
WUS-1. Identify and quantify wetlands and other waters of the United States	a) Before SJRRP actions that may affect waters of the United States or waters of the State, Reclamation will map the distribution of wetlands (including vernal pools and other seasonal wetlands) in the Eastside and Mariposa bypasses. b) The project proponent will determine, based on the mapped distribution of these wetlands and hydraulic modeling and field observation, the acreage of effects, if any, on waters of the United States. c) If it is determined that vernal pools or other seasonal wetlands will be affected by the SJRRP, the project proponent will conduct a delineation of waters of the United States, and submit the delineation to USACE for verification. The delineation will be conducted according to methods established in the USACE *Wetlands Delineation Manual* (Environmental Laboratory 1987) and *Arid West Supplement* (Environmental Laboratory 2008). d) Construction and modification of road crossings, control structures, fish barriers, fish passages, and other structures will be designed to minimize effects on waters of the United States and waters of the State, and will employ BMPs to avoid indirect effects on water quality.	Project and Program	USACE
WUS-2. Obtain permits and compensate for any loss of wetlands and other waters of the United States/waters of the State	a) The project proponent, in coordination with USACE, will determine the acreage of effects on waters of the United States and waters of the State that will result from implementation of the SJRRP. b) The project proponent will adhere to a "no net loss" basis for the acreage of wetlands and other waters of the United States and waters of the State that will be removed and/or degraded. Wetland habitat will be restored, enhanced, and/or replaced at acreages and locations and by methods agreed on by USACE,~~ and~~ the Central Valley RWQCB, and DFG, as appropriate, depending on agency jurisdiction. c) The project proponent will obtain Section 404 and Section 401 permits and comply with all permit terms. The acreage, location, and methods for compensation will be determined during the Section 401 and Section 404 permitting processes. d) The compensation will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of this Draft PEIS/R).	Project and Program	USACE

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
INV	**Invasive plants**		
INV-1. Implement the Invasive Vegetation Monitoring and Management Plan	a) Reclamation and the project lead agencies will implement the Invasive Vegetation Monitoring and Management Plan for the SJRRP (Appendix L of this Draft PEIS/R), which includes measures to monitor, control, and where possible eradicate, invasive plant infestations during flow releases and construction activities. b) The implementation of the Invasive Vegetation Monitoring and Management Plan (Appendix L of this Draft PEIS/R) will include monitoring procedures, thresholds for management responses, success criteria, and adaptive management measures for controlling invasive plant species. c) The control of invasive weeds and other recommended actions in the Invasive Vegetation Monitoring and Management Plan (Appendix L of this Draft PEIS/R) will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of this Draft PEIS/R).	Project and Program	Lead Agency
CP	**Conservation plans**		
CP-1. Remain consistent with approved conservation plans	a) Facility siting and construction activities will be conducted in a manner consistent with the goals and strategies of adopted habitat conservation plans, natural community conservation plans, or other approved local, regional, or State habitat conservation plans to the extent feasible. Coordination shall occur with USFWS and/or DFG, as appropriate.	Program	USFWS DFG
CP-2. Compensate effects consistent with approved conservation plans	a) The project proponent shall compensate effects consistent with applicable conservation plans and implement all applicable measures required by the plans.	Program	USFWS DFG
GS	**Southern distinct population segment of North American green sturgeon**		
GS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions ~~within~~ affecting green sturgeon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place when the action(s) are performed.	Project and Program	NMFS

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CVS	**Central Valley steelhead**		
CVS-1. Avoid loss of habitat and risk of take of species	a) Impacts to habitat conditions (i.e., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat, etc.) must be analyzed in consultation with NMFS. b) The Hills Ferry Barrier will be operated and maintained to exclude Central Valley steelhead from the Restoration Area during construction activities and until suitable habitat conditions are restored. c) Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. d) Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. e) Disturbance of riparian vegetation will be avoided to the greatest extent practicable. f) A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall be implemented in case of a spill. g) Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. h) A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction, to monitor implementation of conservation measures and water quality. i) The San Joaquin River channel shall be designed to decrease or eliminate predator holding habitat, in coordination with NMFS.	Project and Program	NMFS

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CVS-2. Minimize loss of habitat and risk of take of species	a) In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. b) In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. c) Construction BMPs for off-channel staging, and storage of equipment and vehicles, will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. d) Riparian vegetation removed or damaged will be replaced at a ratio, coordinated with NMFS, within the immediate area of the disturbance to maintain habitat quality. e) If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction, and following completion, to evaluate species presence and condition and/or habitat conditions. f) If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	Program	NMFS
WRCS	**Sacramento Valley winter-run Chinook salmon**		
WRCS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions related to the SJRRP in the vicinity of winter-run Chinook salmon habitat shall be performed in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed.	Project and Program	NMFS DFG
SRCS	**Central Valley spring-run Chinook salmon**		
SRCS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions in the vicinity of spring-run Chinook salmon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed. b) SJRRP actions shall be performed in accordance with the Experimental Population 4(d) rule, as it is developed, and where applicable.	Project and Program	NMFS DFG

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EFH	**Essential fish habitat (Pacific salmonids and starry flounder)**		
EFH-1. Avoid loss of habitat and risk of take of species	a) Impacts to habitat conditions (e.g., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat) must be analyzed in consultation with NMFS. b) The Hills Ferry Barrier will be operated and maintained to exclude Pacific salmonids from the Restoration Area during construction activities, and until suitable habitat conditions are restored. Under historical operations, the Hills Ferry Barrier is operated September through mid-December. The period of operation under this measure may vary from historical operations. c) Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. d) Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. e) Disturbance of riparian vegetation will be avoided to the greatest extent practicable. f) A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall be implemented in case of a spill. g) Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. h) A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction to monitor implementation of conservation measures and water quality. i) The bottom topography of the San Joaquin River channel will be designed to decrease or eliminate predator holding habitat. j) The SJRRP will be operated in such a way that actions in the vicinity of starry flounder habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed.	Project and Program	NMFS

Table ES-6.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EFH-2. Minimize loss of habitat and risk of take from implementation of construction activities	a) In-channel construction activities that could affect habitat for will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. b) In-channel construction activities that could affect habitat for starry flounder and Pacific salmonids will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. c) Construction BMPs for off-channel staging and storage of equipment and vehicles will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. d) Riparian vegetation removed or damaged will be replaced at a ratio, coordinated with NMFS, within the immediate area of the disturbance to maintain habitat quality. e) If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction and following completion to evaluate species presence and condition and/or habitat conditions. f) If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	Program	NMFS

Key:
°C = degrees Celsius
°F = degrees Farenheit
BMP = best management practice
BO = Biological Opinion
CFR = Code of Federal Regulations
cfs = cubic feet per second
CNDDB = California Natural Diversity Database
CVP = Central Valley Project
DFG = California Department of Fish and Game
DWR = California Department of Water Resources
EPA = Federal Environmental Protection Agency
NMFS = National Marine Fisheries Service
PEIS/R = Program Environmental Impacts Statement/Report
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
RWQCB = Regional Water Quality Control Board
Settlement = Stipulation of Settlement in *NRDC, et al,. v. Kirk Rodgers, et al.*
SJRRP = San Joaquin River Restoration Program
State = State of California
SWP = State Water Project
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service

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Table ES-7.
Range of Simulated Long-Term Average Annual Water Supply Reduction to Friant-Division Long-Term Contractors

Water Supply Component		Existing Condition (2005)			Future Condition (2030)			
		Alt A1 and A2 (TAF)	Alt B1 and B2 (TAF)	Alt C1 and C2 (TAF)	No-Action Alt (TAF)	Alt A1 and A2 (TAF)	Alt B1 and B2 (TAF)	Alt C1 and C2 (TAF)
Releases for Interim and Restoration Flows[1]		250	250	250	0	250	250	250
Recirculation Under Paragraph 16(a)	Project-Level[~~1~~2]	59	59	59	0	59	59	59
	Program-Level[~~3~~2]	~~0~~ 59	~~6~~ 65	72	0	~~0~~ 59	56	76
Friant-Kern and Madera Canal Diversions at Friant Dam	~~Non-Paragraph 16(b) Diversions~~	~~1,166~~	~~1,166~~	~~1,166~~	~~1,313~~	~~1,166~~	~~1,166~~	~~1,166~~
	Diversions under Class 1 and Class 2 Contracts[4]	986	986	986	1095	986	986	986
	Diversions for Flood Management[5]	2	2	2	2	2	2	2
	Diversions for Canal Losses[6]	63	63	63	63	63	63	63
	Other Non-Paragraph 16(b) Diversions[7]	71	71	71	154	71	71	71
	Diversions Under Paragraph 16(b)[8]	46	46	46	0	46	46	46
Maximum Deliveries to Friant Division[9]		~~1,271~~ 1,227	~~1,271~~ 1,233	~~1,283~~ 1,240	~~1,313~~ 1,317	~~1,271~~ 1,227	~~1,268~~ 1,224	~~1,288~~ 1,244
Range of Potential Reduction[~~3,4~~10]		~~41 – 100~~ 91 – 150	~~41 -100~~ 85 – 150	~~29 -100~~ 78 – 150	0	~~42 -101~~ 90 – 149	~~44 – 101~~ 93 – 149	~~24 -101~~ 73 – 149

Table ES-7.
Range of Simulated Long-Term Average Annual Water Supply Reduction to Friant-Division Long-Term Contractors (contd.)

Notes:
Simulation period: October 1921 – September 2003.

[1] Computed as difference between the minimum No-Action Alternative releases from Millerton Lake to the San Joaquin River less releases for flood control (nonflood releases under the No-Action Alternative), and the releases to the San Joaquin River with implementation of the action alternatives less releases for flood control (nonflood releases under the action alternatives).

[~~1~~2] Project-level recirculation under Paragraph 16(a) is shown as total increase in CVP/SWP exports at existing Delta facilities with implementation of the project-level actions only. ~~deliveries to south-of-Delta Central Valley Project/State Water Project contractors, and is~~ This represents the maximum long-term average annual water supply that would be available for recirculation to Friant Division long-term contractors as a result of Delta diversions only.

[~~2~~3] Program-level recapture under Paragraph 16(a) is shown as total increase in diversions at existing or new facilities in the San Joaquin River with implementation of program-level actions, in addition to the increase in CVP/SWP exports at existing Delta facilities with implementation of the project-level actions. ~~diversion along the San Joaquin River between the Merced River confluence and the Delta (under Alternatives B1, B2, C1, and C2), and is~~ This represents the maximum long-term average annual water supply that would be available for recirculation to Friant Division long-term contractors as a result of these diversions.

[4] Long-term average annual Class 1 and Class 2 contract deliveries as simulated using CalSim II.

[5] Releases from Millerton Lake into Friant-Kern and Madera canals as simulated using CalSim II.

[6] Releases from Millerton Lake to Friant-Kern and Madera canals to overcome in-canal losses assumed in CalSim II.

[7] 215 delivery as simulated using CalSim II, this may include some Class 2 delivery that could not be separated out from 215 delivery using CalSim II.

[8] Computed as the difference in total canal diversion between two CalSim runs, both with the SJRRP, with and without 16(b) delivery

[9] Total delivery from canal diversion and recirculation

[10] The range of potential reduction in long-term annual average water supply reduction is calculated as the difference between ~~of the minimum and maximum long-term average annual water supply deliveries and~~ the long-term average annual water supply delivery under the action alternatives as compared with the No-Action Alternative. Minimal potential reduction assumes recirculation under Paragraph 16(a) (using values shown for program-level evaluation); maximum potential reduction assumes no recirculation under Paragraph 16(a). ~~The minimum long-term average annual water supply delivery is calculated as the deliveries under the No-Action Alternative minus the maximum deliveries to the Friant Division (including diversions at Friant-Kern and Madera canals and supplies recirculated under Paragraph 16(a)). The maximum long-term average annual water supply delivery is calculated as the deliveries No-Action Alternative minus the supplies recirculated under Paragraph 16(a).~~

Key:
Alt = Alternative
~~j~~TAF = thousand acre-feet

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Table ES-8.
Summary of Impacts and Mitigation Measures

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Air Quality: Program-Level				
AIR-1: Construction-Related Emissions of Criteria Air Pollutants and Precursors	No-Action	PSU	--	PSU[1]
	A1	PS	AIR-1: Prepare Project-Level Quantitative Analysis of Construction-Related Emissions and Implement Measures to Minimize Emissions	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]
AIR-2: Operations-Related Emissions of Criteria Air Pollutants and Precursors	No-Action	PSU	--	PSU[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
AIR-3: Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants	No-Action	PSU	--	PSU[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Air Quality: Program-Level (contd.)				
AIR-4: Exposure of Sensitive Receptors to Odor Emissions	No-Action	PSU	--	PSU[2]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Air Quality: Project-Level				
AIR-5: Construction-Related Emissions of Criteria Air Pollutants and Precursors	No-Action	PSU	--	PSU[1]
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
AIR-6: Operations-Related Emissions of Criteria Air Pollutants and Precursors	No-Action	PSU	--	PSU[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Air Quality: Project-Level (contd.)				
AIR-7: Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants	No-Action	PSU	--	PSU[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
AIR-8: Exposure of Sensitive Receptors to Odor Emissions	No-Action	PSU	--	PSU[2]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Biological Resources - Fisheries: Program-Level				
FSH-1: Changes in Water Temperatures in the San Joaquin River Between Friant Dam and the Merced River	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Program-Level (contd.)				
FSH-2: Changes in Pollutant Discharge in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS and Beneficial	--	~~PS~~LTS and Beneficial
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-3: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS	--	~~PS~~LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-4: Construction-Related Changes in Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Program-Level (contd.)				
FSH-5: Displacement from Preferred or Required Habitat, Injury, or Mortality in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-6: Changes in Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-7: Changes in Diversions and Entrainment in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Program-Level (contd.)				
FSH-8: Changes in Predation Levels in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-9: Changes in Food Web Support in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-10: Effects to Fall-Run Chinook Salmon from Hybridization Resulting from Reintroduction of Spring-Run Chinook Salmon to the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Program-Level (contd.)				
FSH-11: Effects of Disease on Fisheries in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-12: Changes in Diversions and Entrainment in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-13: Displacement from Preferred or Required Habitat, Injury, or Mortality in the San Joaquin River Between Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Program-Level (contd.)				
FSH-14: Changes in Water Temperatures in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Biological Resources - Fisheries: Project-Level				
FSH-15: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Upstream from Friant Dam	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-16: Changes in Pollutant Discharge and Mobilization in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-17: Changes in Sediment Discharge and Turbidity in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-18: Changes in Fish Habitat Conditions in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-19: Changes in Diversions and Entrainment in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-20: Changes in Predation Levels in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-21: Changes in Food Web Support in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-22: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Between Friant Dam and the Merced River	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-23: Changes in Pollutant Discharge and Mobilization in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS and Beneficial	--	~~PS~~[1]LTS and Beneficial
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-24: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS	--	~~PS~~LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-25: Changes in Fish Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-26: Changes in Diversions and Entrainment in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-27: Changes in Predation Levels in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-28: Changes in Food Web Support in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-29: Effects of Disease on Fisheries in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-30: Changes in Chinook Salmon and Steelhead Habitat in the Merced, Tuolumne, and Stanislaus Rivers	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-31: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the Delta	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-32: Changes in Pollutant Discharge and Mobilization in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-33: Changes in Sediment Discharge and Turbidity in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-34: Changes in Fish Habitat Conditions in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-35: Changes in Diversions and Entrainment in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-36: Changes in Predation Levels in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-37: Changes in Food Web Support in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Fisheries: Project-Level (contd.)				
FSH-38: Salinity Changes in the Delta	No-Action	PS	--	PS[2]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-39: Changes to Delta Inflow and Flow Patterns in the Delta	No-Action	PS	--	PS[1]
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
Biological Resources - Vegetation and Wildlife: Program-Level				
VEG-1: Substantially Alter Riparian Habitat and Other Sensitive Communities in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Program-Level (contd.)				
VEG-2: Fill, Fragment, Isolate, Divert, or Substantially Alter Jurisdictional Waters of the United States in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-3: Facilitate Increase in Distribution and Abundance of Invasive Plants in the Restoration Area	No-Action	SU	--	SU
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-4: Substantially Affect Special-Status Plant Species in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Program-Level (contd.)				
VEG-5: Substantially Reduce Habitat or Populations of Special-Status Animals in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-6: Substantially Alter Designated Critical Habitat in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-7: Conflict with Adopted Conservation Plans in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Program-Level (contd.)				
VEG-8: Substantially Alter Riparian Habitat and Other Sensitive Communities Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-9: Fill, Fragment, Isolate, Divert, or Substantially Alter Jurisdictional Waters of the United States Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-10: Facilitate Increase in Distribution and Abundance of Invasive Plants Between the Merced River and the Delta	No-Action	SU	--	SU
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Program-Level (contd.)				
VEG-11: Substantially Alter Special-Status Plant Species Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-12: Substantially Reduce Habitat or Populations of Special-Status Animals Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-13: Substantially Alter Designated Critical Habitat Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Program-Level (contd.)				
VEG-14: Conflict with Adopted Conservation Plans Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Biological Resources - Vegetation and Wildlife: Project-Level				
VEG-15: Effects of Surface Water Fluctuation on Biological Resources Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-16: Substantially Alter Riparian Habitat and Other Sensitive Communities in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Project-Level (contd.)				
VEG-17: Fill, Fragment, Isolate, Divert, or Substantially Alter Jurisdictional Waters of the United States in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-18: Facilitate Increase in Distribution and Abundance of Invasive Plants in Sensitive Natural Communities in the Restoration Area	No-Action	SU	--	SU[2]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-19: Substantially Affect Delta Button-Celery and Other Special-Status Plant Species in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Project-Level (contd.)				
VEG-20: Substantially Reduce Habitat or Populations of Special-Status Animal Species in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-21: Substantially Alter Designated Critical Habitat in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-22: Conflict with Provisions of Adopted Habitat Conservation Plans, Natural Community Conservation Plans, and Other Approved Local, Regional, or State Conservation Plans in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources - Vegetation and Wildlife: Project-Level (contd.)				
VEG-23: Substantially Affect Special-Status Species, Sensitive Communities, Jurisdictional Waters of the United States, and Adopted Conservation Plans Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-24: Substantially Affect Special-Status Species, Sensitive Communities, Jurisdictional Waters of the United States, and Adopted Conservation Plans in the Delta	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VEG-25: Substantially Affect Special-Status Species, Sensitive Communities, Jurisdictional Waters of the United States, and Adopted Conservation Plans in the CVP/SWP Water Service Areas	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Climate Change: Program-Level[3]				
CLM-1: Construction-Related Emissions of GHGs	A1	PS	CLM-1: Implement All Feasible Measures to Reduce Emissions	PSU[2]
	A2	PS		PSU[2]
	B1	PS		PSU[2]
	B2	PS		PSU[2]
	C1	PS		PSU[2]
	C2	PS		PSU[2]
CLM-2: Operational Emissions of GHGs	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Climate Change: Project-Level[3]				
CLM-3: Construction-Related Emissions of GHGs	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Climate Change: Project-Level[3] (contd.)				
CLM-4: Operational Emissions of GHGs	A1	PS	CLM-1: Implement All Feasible Measures to Reduce Emissions	PSU[2]
	A2	PS		PSU[2]
	B1	PS		PSU[2]
	B2	PS		PSU[2]
	C1	PS		PSU[2]
	C2	PS		PSU[2]
Cultural Resources: Program-Level				
CUL-1: Disturbance or Destruction of Cultural Resources Within the Restoration Area	No-Action	No Impact	--	No Impact
	A1	PS	CUL-1: Comply with Section 106 of the NHPA Process or Equivalent	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
Cultural Resources: Project-Level				
CUL-2: Disturbance or Destruction of Cultural Resources Around Millerton Lake	No-Action	LTS	--	LTS
	A1	PS	CUL-2: Comply with Section 106 of the NHPA and Develop and Implement a Programmatic Agreement	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Cultural Resources: Project-Level (contd.)				
CUL-3: Disturbance or Destruction of Cultural Resources in the Restoration Area	No-Action	LTS	--	LTS
	A1	PS	CUL-2: Comply with Section 106 of the NHPA and Develop and Implement a Programmatic Agreement	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
CUL-4: Disturbance or Destruction of Cultural Resources Along the San Joaquin River Downstream from the Merced River	No-Action	LTS	--	LTS
	A1	PS	CUL-2: Comply with Section 106 of the NHPA and Develop and Implement a Programmatic Agreement	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
Geology and Soils: Program-Level				
GEO-1: Potential Localized Soil Erosion, Sedimentation, and Inadvertent Permanent Soil Loss	No-Action	LTS	--	LTS
	A1	PS	GEO-1: Prepare and Implement a Stormwater Pollution Prevention Plan that Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Geology and Soils: Program-Level (contd.)				
GEO-2: Potential Loss of Availability of a Known Mineral Resource of Value	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Geology and Soils: Project-Level				
GEO-3: Potential Localized Soil Erosion, Sedimentation, and Inadvertent Permanent Soil Loss	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
GEO-4: Potential Increase in Channel Erosion, Sediment Transport, and Meander Migration from San Joaquin River Flows	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Geology and Soils: Project-Level				
GEO-5: Potential Loss of Availability of a Known Mineral Resource of Value	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Hydrology - Flood Management: Program-Level				
FLD-1: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam	No-Action	No Impact	--	No Impact
	A1	PS	FLD-1: Implement Design Standards to Minimize Risk of Loss, Injury, or Death Involving Flooding	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Flood Management: Program-Level (contd.)				
FLD-2: Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FLD-3: Substantially Alter the existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FLD-4: Placement of Structures Within a 100-Year Flood Hazard Area Structures That Would Impede or Redirect Flood Flows	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Flood Management: Program-Level (contd.)				
FLD-5: Placement of Housing Within a 100-Year Flood Hazard Area, as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Hydrology - Flood Management: Project-Level				
FLD-6: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FLD-7: Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Flood Management: Project-Level (contd.)				
FLD-8: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
FLD-9: Placement of Structures Within a 100-Year Flood Hazard Area Structures That Would Impede or Redirect Flood Flows	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
FLD-10: Placement of Housing Within a 100-Year Flood Hazard Area, as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Groundwater: Program-Level				
GRW-1: Temporary Construction-Related Effects on Groundwater Quality	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	PS	GRW-1a: Prepare and Implement a Stormwater Pollution Prevention Plan That Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities GRW-1b: Conduct Phase I Environmental Site Assessments	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
Hydrology - Groundwater: Project-Level				
GRW-2: Changes in Groundwater Levels Along the San Joaquin River from Friant Dam to the Delta	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
GRW-3: Changes in Groundwater Quality Along the San Joaquin River from Friant Dam to the Delta	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Groundwater: Project-Level (contd.)				
GRW-4: Changes in Groundwater Levels in CVP/SWP Water Service Areas	No-Action	PSU	--	PSU[1]
	A1	PSU	--	PSU[1]
	A2	PSU	--	PSU[1]
	B1	PSU	--	PSU[1]
	B2	PSU	--	PSU[1]
	C1	PSU	--	PSU[1]
	C2	PSU	--	PSU[1]
GRW-5: Changes in Groundwater Quality in CVP/SWP Water Service Areas	No-Action	PSU	--	PSU[1]
	A1	PSU	--	PSU[1]
	A2	PSU	--	PSU[1]
	B1	PSU	--	PSU[1]
	B2	PSU	--	PSU[1]
	C1	PSU	--	PSU[1]
	C2	PSU	--	PSU[1]
Hydrology - Surface Water Supplies and Facilities Operations: Program-Level				
SWS-1: Changes in Diversion Capacities	No-Action	No Impact	--	No Impact
	A1	PS	SWS-1: Provide Alternate Temporary or Permanent River Access to Avoid Diversion Losses	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Surface Water Supplies and Facilities Operations: Project-Level				
SWS-2: Change in Water Levels in the Old River near the Tracy Road Bridge	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SWS-3: Change in Water Levels in the Grant Line Canal near the Grant Line Canal Barrier	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SWS-4: Change in Water Levels in the Middle River near the Howard Road Bridge	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
SWS-5: Change in Recurrence of Delta Excess Conditions	No-Action	PS	--	PS[2]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Hydrology - Surface Water Quality: Program-Level				
SWQ-1: Temporary Construction-Related Effects on Surface Water Quality in the San Joaquin River from Friant Dam to the Merced River, San Joaquin River from the Merced River to the Delta, the Delta, and CVP/SWP Water Service Areas	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	PS	SWQ-1A: Prepare and Implement a Stormwater Pollution Prevention Plan that Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities SWQ-1B: Conduct and Comply with Phase I Environmental Site Assessments in the Restoration Area	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
SWQ-2: Long-Term Effects on Water Quality that Cause Violations of Existing Water Quality Standards or Adversely Affect Beneficial Uses in the CVP/SWP Water Service Areas	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Surface Water Quality: Project-Level				
SWQ-3: Long-Term Effects on Water Quality that Cause Violations of Existing Water Quality Standards or Adversely Affect Beneficial Uses in Millerton Lake	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SWQ-4: Long-Term Effects on Water Quality that Cause Violations of Existing Water Quality Standards or Adversely Affect Beneficial Uses in the San Joaquin River from Friant Dam to the Merced River	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SWQ-5: Long-Term Effects on Water Quality that Cause Violations of Existing Water Quality Standards or Adversely Affect Beneficial Uses in the San Joaquin River from the Merced River to the Delta	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Hydrology - Surface Water Quality: Project-Level (contd.)				
SWQ-6: Effects on X2 Position	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
Hydrology - Surface Water Quality: Project-Level (contd.)				
SWQ-7: Delta Salinity in San Joaquin River at Vernalis, San Joaquin River at Brandt Bridge, Old River near Middle River, and Old River at Tracy Road Bridge	No-Action	LTS	--	LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
SWQ-8: Delta Salinity in San Joaquin River at Jersey Point, Sacramento River at Emmaton, and Sacramento River at Collinsville	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
SWQ-9: Delta Water Quality at Contra Costa Water District's Contra Costa Canal Pumping Plant No. 1, Old River at Los Vaqueros Intake, and Proposed Victoria Canal Intake, and City of Stockton's Proposed Delta Intake	No-Action	LTS	--	LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
SWQ-10: Water Quality in the Delta-Mendota Canal at Jones Pumping Plant and in the West Canal at the Clifton Court Forebay	No-Action	LTS	--	LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Indian Trust Assets: Program-Level				
ITA-1: Affect Land, Minerals, Federally Reserved Hunting and Fishing Rights, Federally Reserved Water Rights, and In-Stream Flows Associated With Trust Land	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
Indian Trust Assets: Project-Level				
ITA-2: Affect Land, Minerals, Federally Reserved Hunting and Fishing Rights, Federally Reserved Water Rights, and In-Stream Flows Associated With Trust Land	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use: Program-Level				
LUP-1: Conversion of Important Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	No-Action	SU	--	SU[1]
	A1	Significant	LUP-1a: Design and Implement Levee Setbacks to Preserve Agricultural Productivity of Important Farmland to the Extent Possible and Comply with the Surface Mining and Reclamation Act LUP-1b: Minimize Impacts on Williamson Act–Contracted Lands, Comply with Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators	SU[1]
	A2	Significant		SU[1]
	B1	Significant		SU[1]
	B2	Significant		SU[1]
	C1	Significant		SU[1]
	C2	Significant		SU[1]
LUP-2: Conversion of Riparian Forest to Non-Forest Uses	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use: Program-Level (contd.)				
LUP-3: Conflict with Adopted Land Use Plans, Goals, Policies, and Ordinances of Affected Jurisdictions	No-Action	No Impact	--	No Impact
	A1	SU	--	SU[1]
	A2	SU	--	SU[1]
	B1	SU	--	SU[1]
	B2	SU	--	SU[1]
	C1	SU	--	SU[1]
	C2	SU	--	SU[1]
Land Use: Project-Level				
LUP-4: Physically Divide or Disrupt an Established Community	No-Action	No Impact	--	No Impact
	A1	PS	LUP-4: Implement Vehicular Traffic Detour Planning	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
LUP-5: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Inundation and/or Soil Saturation	No-Action	No Impact	--	No Impact
	A1	PS	LUP-5: Preserve Agricultural Productivity of Important Farmland to Minimize Effects of Inundation and Saturation Effects	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use: Project-Level (contd.)				
LUP-6: Diminishment of Agricultural Production by Increased Orchard and Vineyard Diseases	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
LUP-7: Potential Conversion of Riparian Forest Because of Altered Inundation	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
LUP-8: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Water Deliveries	No-Action	No Impact	--	No Impact
	A1	SU	--	SU[1]
	A2	SU	--	SU[1]
	B1	SU	--	SU[1]
	B2	SU	--	SU[1]
	C1	SU	--	SU[1]
	C2	SU	--	SU[1]

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Noise: Program-Level				
NOI-1: Exposure of Sensitive Receptors to Generation of Temporary and Short-Term Construction Noise	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	NOI-1: Implement Measures to Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]
NOI-2: Exposure of Sensitive Receptors to Increased Off-Site Traffic Noise Levels	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	NOI-2: Implement Measures to Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Noise: Program-Level (contd.)				
NOI-3: Exposure of Sensitive Receptors to Long-Term Operation-Related Noise Levels from Stationary Sources	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	PS	NOI-3: Implement Measures to Reduce Long-Term Operation-Related Noise Levels from Stationary Sources on Sensitive Receptors	LTS
	C2	PS		LTS
NOI-4: Exposure of Sensitive Receptors to Increased Noise from Borrow Site-Related Activities	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	NOI-4: Implement Measures to Reduce Borrow Site Noise Levels Near Sensitive Receptors	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Noise: Program-Level (contd.)				
NOI-5: Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	NOI-5: Implement Measures to Reduce Temporary and Short-term Groundborne Noise and Vibration Levels Near Sensitive Receptors	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
Noise: Project-Level				
NOI-6: Effects of the ~~Reo~~Operation of Friant Dam on the Noise Environment	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Paleontological Resources: Program-Level				
PAL-1: Possible Damage to or Destruction of Unique Paleontological Resources	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	PAL-1: Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
Paleontological Resources: Project-Level				
PAL-2: Possible Damage to or Destruction of Unique Paleontological Resources	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Power and Energy: Program-Level				
PWR-1: Decrease in CVP and SWP Energy Generation	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
PWR-2: Increase in CVP and SWP Energy Consumption	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
PWR-3: Increased Energy Consumption as a Result of Construction Activities	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Power and Energy: Program-Level (contd.)				
PWR-4: Increased Energy Consumption Within Friant Division	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
Power and Energy: Project-Level				
PWR-5: Decrease in CVP and SWP Energy Generation	No-Action	LTS and Beneficial	--	LTS and Beneficial
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
PWR-6: Increase in CVP and SWP Energy Consumption	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Power and Energy: Project-Level (contd.)				
PWR-7: Change in Energy Generation at Friant Dam	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
PWR-8: Increased Energy Consumption Within Friant Division	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Public Health and Hazardous Materials: Program-Level				
PHH-1: Exposure of Construction Workers and Others to Hazardous Materials	No-Action	No Impact	--	No Impact
	A1	PS	PHH-1: Conduct Phase I Environmental Site Assessments	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Public Health and Hazardous Materials: Program-Level (contd.)				
PHH-2: Creation of a Substantial Hazard to the Public or the Environment Through the Use of Hazardous Materials	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
PHH-3: Exposure to Naturally Occurring Asbestos	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
PHH-4: Exposure to Diseases	No-Action	No Impact	--	No Impact
	A1	PS	PHH-4: Implement Workplace Precautions against West Nile Virus and Valley Fever	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Public Health and Hazardous Materials: Program-Level (contd.)				
PHH-5: Creation of a Substantial Hazard to School Safety	No-Action	No Impact	--	No Impact
	A1	PS	PHH-5: Minimize Hazards to School Safety	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
PHH-6: Substantial Hazard from Idle and Abandoned Wells	No-Action	No Impact	--	No Impact
	A1	PS	PHH-6: Minimize Hazards from Idle and Abandoned Wells	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
PHH-7: Creation of a Substantial Hazard from Wildland Fires	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Public Health and Hazardous Materials: Program-Level (contd.)				
PHH-8: Creation of a Substantial Hazard to Aircraft Safety	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Public Health and Hazardous Materials: Project-Level				
PHH-9: Exposure to Diseases in the San Joaquin River Upstream from Friant Dam, in the Restoration Area, and in the San Joaquin River from Merced River to the Delta	No-Action	No Impact	--	No Impact
	A1	PS	PHH-9: Coordinate with and Support Vector Control District(s)	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Public Health and Hazardous Materials: Project-Level (contd.)				
PHH-10: Exposure to Diseases in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Recreation: Program-Level				
REC-1: Increased Use of Facilities at Millerton Lake State Recreation Area and Demand for Recreation Opportunities at Millerton Lake and Vicinity	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
REC-2: Increased Use of Recreation Facilities and Demand for Recreation Opportunities in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level (contd.)				
REC-3: Effects of Construction, Operation, and Maintenance of New Projects or Facilities on Recreation Opportunities in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS
	B1	LTS	--	LTS
	B2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS
	C1	LTS	--	LTS
	C2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level (contd.)				
REC-4: Effects of Reintroducing Salmon to the Restoration Area on Reach 1 Angling Opportunities	No-Action	No Impact	--	No Impact
	A1	PS	REC-4: Enhance Fishing Access and Fish Populations on the Kings River Below Pine Flat Dam	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
REC-5: Effects on Reach 1 Warm-Water Angling Opportunities from Program Actions within the Restoration Area	No-Action	No Impact	--	No Impact
	A1	PS	REC-5: Enhance Warm-Water Fishing Access and Fish Populations in the Vicinity of the San Joaquin River Below Friant Dam	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
REC-6: Effects on Wildlife-Based Recreation Opportunities from Enhanced Wildlife Habitat Conditions Caused by Program Actions Within the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level (contd.)				
REC-7: Effects of Construction, Operation, and Maintenance of New Projects or Facilities on Recreation Opportunities on the San Joaquin River Between Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
REC-8: Effects of Reintroducing Salmon to the San Joaquin River Between Friant Dam and the Merced River on Angling Opportunities Downstream	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
Recreation: Project-Level				
REC-9: Effects on Recreation Opportunities from Earlier Seasonal Drawdown of Millerton Lake Related to Timing of Release of Interim and Restoration Flows	No-Action	No Impact	--	No Impact
	A1	PS	REC-9: Extend Millerton Lake Boat Ramps or Construct a New Low-water Ramp to Allow Boat Launching at the Lower Pool Elevations that May Result from Interim and Restoration Flows during Dry and Critical-High Years	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Project-Level (contd.)				
REC-10: Effects on Recreation Facilities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
REC-11: Effects on Swimming or Wading and Fishing Opportunities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
REC-12: Effects on Boating Opportunities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	Significant	REC-12: Develop and Implement Recreation Outreach Program	LTS
	A2	Significant		LTS
	B1	Significant		LTS
	B2	Significant		LTS
	C1	Significant		LTS
	C2	Significant		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Project-Level (contd.)				
REC-13: Effects on Wildlife-Based Recreation Opportunities from Enhanced Wildlife Habitat Conditions Related to Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
REC-14: Effects on Warm-Water Fishing Opportunities from Enhanced Fish Populations Related to Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
REC-15: Effects on Warm-Water Fishing Opportunities from Increased Flow in the San Joaquin River from the Merced River to the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Project-Level (contd.)				
REC-16:Effects on Warm-Water and Cold-Water Fishing Opportunities from Increased Flow into the Sacramento-San Joaquin Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
Socioeconomics: Program-Level				
SOC-1: Change in Regional Employment Levels	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
SOC-2: Change in Regional Population Levels	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Socioeconomics: Program-Level (contd.)				
SOC-3: Change in Regional Housing Demand	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Socioeconomics: Project-Level				
SOC-4: Change in Regional Employment Levels	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SOC-5: Change in Regional Population Levels	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Socioeconomics: Project-Level (contd.)				
SOC-6: Change in Regional Housing Demand	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
SOC-7: Physical Decay in Communities	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Transportation and Infrastructure: Program-Level				
TRN-1: Reduced Traffic Circulation and Roadway Capacity	No-Action	LTS	--	LTS
	A1	PS	TRN-1: Minimize Short-term Impacts on Traffic Circulation and Roadway Capacity	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Transportation and Infrastructure: Program-Level (contd.)				
TRN-2: Creation of a Hazard as a Result of a Design Feature	No-Action	No Impact	--	No Impact
	A1	PS	TRN-2: Avoid Disruption of Subsurface Utility Facilities	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
TRN-3: Reduced Emergency Access	No-Action	No Impact	--	No Impact
	A1	PS	TRN-1: Minimize Short-term Impacts on Traffic Circulation and Roadway Capacity	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
TRN-4: Reduced Bicycle and Pedestrian Circulation	No-Action	No Impact	--	No Impact
	A1	PS	TRN-4: Minimize Impacts on Public Bicycle and Pedestrian Circulation Facilities	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Transportation and Infrastructure: Project-Level				
TRN-5: Reduced Traffic Circulation and Roadway Capacity	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
TRN-6: Creation of a Hazard as a Result of a Design Feature	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
TRN-7: Inadequate Emergency Access	No-Action	No Impact	--	No Impact
	A1	PS	TRN-7: Implement Vehicular Traffic Detour Planning	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Transportation and Infrastructure: Project Level (contd.)				
TRN-8: Reduced Bicycle and Pedestrian Circulation	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Utilities and Service Systems: Program-Level				
UTL-1: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
UTL-2: Potential Reduction in Ability of Facilities in the Restoration Area to Meet Wastewater Treatment Requirements	No-Action	LTS	--	LTS
	A1	PS	UTL-2: Obtain Required Permits for Hatchery Wastewater Discharges and Implement Best Management Practices to Reduce Pollutant Discharges	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level (contd.)				
UTL-3: Potential for Insufficient Water Supply and Resources in the Restoration Area	No-Action	PS	--	PS[1]
	A1	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A2	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	B1	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	B2	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	C1	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	C2	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
UTL-4: Potential for Generation of Solid Waste in the Restoration Area in Excess of Permitted Landfill Capacity	No-Action	LTS	--	LTS
	A1	PS	UTL-4: Identify Landfills with Adequate Permitted Capacity to Accept Solid Waste Generated by Settlement Activities and Dispose of Waste in Accordance with Applicable Regulations	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level (contd.)				
UTL-5: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
UTL-6: Potential for Insufficient Existing Water Supply and Resources Between the Merced River and the Delta	No-Action	PS	--	PS[1]
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
UTL-7: Potential for Generation of Solid Waste Between the Merced River and the Delta in Excess of Permitted Landfill Capacity	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level (contd.)				
UTL-8: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services Between the Merced River and the Delta	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Utilities and Service Systems: Project-Level				
UTL-9: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	No-Action	PS	--	PS[1]
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
UTL-10: Potential Reduction in Ability of Facilities in the Restoration Area to Meet Wastewater Treatment Requirements	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
UTL-11: Potential for Insufficient Existing Water Supply and Resources in the Restoration Area	No-Action	PS	--	PS[1]
	A1	PSU	--	PSU[1]
	A2	PSU	--	PSU[1]
	B1	PSU	--	PSU[1]
	B2	PSU	--	PSU[1]
	C1	PSU	--	PSU[1]
	C2	PSU	--	PSU[1]
UTL-12: Potential for Generation of Solid Waste in the Restoration Area in Excess of Permitted Landfill Capacity	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
UTL-13: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
UTL-14: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
UTL-15: Potential Reduction in Ability of Facilities Between the Merced River and the Delta to Meet Wastewater Treatment Requirements	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
~~UTL-16: Potential for Insufficient Existing Water Supply and Resources from Recapture of Interim and Restoration Flows Between the Merced River and the Delta~~	~~No-Action~~	~~No Impact~~	~~--~~	~~No Impact~~
	~~A1~~	~~PSU~~	~~--~~	~~PSU[2]~~
	~~A2~~	~~PSU~~	~~--~~	~~PSU[2]~~
	~~B1~~	~~PSU~~	~~--~~	~~PSU[2]~~
	~~B2~~	~~PSU~~	~~--~~	~~PSU[2]~~
	~~C1~~	~~PSU~~	~~--~~	~~PSU[2]~~
	~~C2~~	~~PSU~~	~~--~~	~~PSU[2]~~

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
UTL-17: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Visual Resources: Program-Level				
VIS-1: Temporary and Short-Term Construction-Related Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character	No-Action	No-Impact	--	No-Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Visual Resources: Program-Level (contd.)				
VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	PS	VIS-2: Screen New Facilities and Minimize Adverse Visual Impacts	PSU[1]
	A2	PS		PSU[1]
	B1	PS		PSU[1]
	B2	PS		PSU[1]
	C1	PS		PSU[1]
	C2	PS		PSU[1]
VIS-3: Substantial Changes in Light or Glare	No-Action	No-Impact	--	No-Impact
	A1	PS	VIS-3: Establish and Require Conformance to Lighting Standards, and Prepare and Implement a Lighting Plan	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

Table ES-8.
Summary of Impacts and Mitigation Measures (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Visual Resources: Project-Level				
VIS-4: Effects of Friant Dam ~~Reo~~Operation on Scenic Vistas, Scenic Resources, and Existing Visual Character Upstream from Friant Dam	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
VIS-5: Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character Downstream from Friant Dam	No-Action	Too Speculative for Meaningful Consideration	--	Too Speculative for Meaningful Consideration
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Notes:
[1] An analysis was performed in compliance with Executive Order 12898, Environmental Justice, which found that this impact would have the potential to result in disproportionately high and adverse effect on minority and/or low-income populations.
[2] An analysis was performed in compliance with Executive Order 12898, Environmental Justice, which found that this impact would not have the potential to result in disproportionately high and adverse effect on minority and/or low-income populations.
[3] Because analysis of the environmental effects of GHG emissions from the program alternatives is addressed as a cumulative impact analysis, and the No-Action Alternative by definition cannot contribute to a cumulative impact, no significance determination is made for the No-Action Alternative.
Key:
CVP = Central Valley Project
GHG = greenhouse gas
LTS = less than significant
NHPA = National Historic Preservation Act
PS = potentially significant
PSU = potentially significant and unavoidable
SU = significant and unavoidable
SWP = State Water Project
X2 = geographic location of 2 parts per thousand salinity isohaline in Delta, measured from Golden Gate bridge in Suisun Bay

4.2 List of Abbreviations and Acronyms

Page xliii, line 40:

GCM Global Circulation Model

4.3 Chapter 1.0, "Introduction"

Page 1-4, line 11:

change, pending completion of compliance, coordination, consultation, available funding, data collection,

Page 1-12, Table 1-3:

Table 1-3.
Compliance, Consultation, and Coordination Supported By This Draft PEIS/R

Resource	Applicable Laws/Regulations/Permits	Regulating Agency/Agencies	Level of Compliance of Applicable Actions
All	San Joaquin River Restoration Settlement Act	Secretary of the Interior	Program and Project
Wetlands, Waters of the United States, and Federal Levees	Section 404 of the Clean Water Act – Individual or General Permit	U.S. Army Corps of Engineers	Program
	Section 10 of the Rivers and Harbors Act ~~Clean Water Act~~ – Individual or General Permit	U.S. Army Corps of Engineers	Program
Wetlands, Waters of the United States, and Federal Levees (contd.)	Section 14 of the Rivers and Harbors Act ~~Clean Water Act~~ ("Section 408") – Permission	U.S. Army Corps of Engineers	Program
	Section 401 of the Clean Water Act – Water Quality Certification or Waiver	Regional Water Quality Control Board	Program
	Section 402 of the Clean Water Act – National Pollutant Discharge Elimination System permit(s)	State Water Resources Control Board and Regional Water Quality Control Board	Program
	Sections 1600 through 1607 of the California Fish and Game Code – Streambed Alteration Agreement	California Department of Fish and Game	Program

Table 1-3.
Compliance, Consultation, and Coordination Supported By This Draft PEIS/R (contd.)

Resource	Applicable Laws/Regulations/Permits	Regulating Agency/Agencies	Level of Compliance of Applicable Actions
Federally Listed Species	Section 4(d) of the Federal Endangered Species Act – Issuance of regulations pertaining to reintroduction of Chinook salmon	National Marine Fisheries Service	Program
	Section 7 of the Federal Endangered Species Act – Section 7 Consultation	U.S. Fish and Wildlife Service and National Marine Fisheries Service	Program and Project
	Section 10(a)(1)(A) of the Federal Endangered Species Act – Section 10(a)(1)(A) permit	National Marine Fisheries Service	Program
	Section 10(j) of the Federal Endangered Species Act – Section 10 permit	National Marine Fisheries Service	Program
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service	Program and Project
Fish and Wildlife Resources	Fish and Wildlife Coordination Act report	U.S. Fish and Wildlife Service	Program and Project
Cultural Resources	National Historic Preservation Act – Section 106 Consultation	State Historic Preservation Officer	Program and Project
State-Listed Species/State Special-Status Species	Section 2081 of the California Endangered Species Act – Incidental Take Permit/Consistency Determination	California Department of Fish and Game	Program and Project
	California Native Plant Protection Act	California Department of Fish and Game	Program and Project
Levees and Floodways	Central Valley Flood Protection Board Encroachment Permit and 33 Code of Federal Regulations 208.10 (U.S. Army Corps of Engineers review)	Central Valley Flood Protection Board and U.S. Army Corps of Engineers	Program
Water Rights	California Water Code – Water Right Petitions (including petitions for changes to Water Right Permits 11885, 11886, and 11887, and License 1986)	State Water Resources Control Board	Program and Project
State Lands	Land Use Lease	State Lands Commission	Program
Air Quality	Authority to Construct, Permit to Operate	San Joaquin Valley Air Pollution Control District	Program
State-Owned Roadways	Encroachment Permit	California Department of Transportation	Program
Surface Mining	California Surface Mining and Reclamation Act permit	California Surface Mining and Reclamation Act lead agencies and California Department of Conservation	Program

Page 1-13, lines 19-24:

- *Water Year 2010 Interim Flows Project EA/FONSI and IS/MND*. Reclamation and DWR. September 2009.
- *Recirculation of Recaptured Water Year 2010 San Joaquin River Restoration Program Interim Flows EA/FONSI*. Reclamation. February 2011.
- *Draft San Joaquin River Restoration Program Geotechnical Investigation and Seepage Well Installation Project IS/MND*. DWR. October 2009
- *Water Year 2011 Interim Flows Project Supplemental EA/FONSI*. Reclamation. September 2010.
- *Recirculation of Recaptured Water Year 2011 San Joaquin River Restoration Program Interim Flows EA/FONSI*. Reclamation. June 2011.
- *Water Year 2012 Interim Flows Project Supplemental EA/FONSI*. Reclamation. September 2011.

Page 1-15, line 14:

a program level in the Final PEIS/R. DFG has also been identified as a Responsible Agency that will have regulatory authority over natural resources that may be impacted under the action alternatives. As a Responsible Agency, DFG may take discretionary action pursuant to this PEIS/R or a subsequent site-specific CEQA compliance document.

4.1 Chapter 2.0, "Description of Alternatives"

Page 2-9, Table 2-2:

Table 2-2.
NEPA/CEQA Level of Compliance for Actions Included Under Action Alternatives

Category	Action	Action Alternative A1	A2	B1	B2	C1	C2	Level of NEPA/CEQA Compliance
~~Reo~~Operate Friant Dam and Downstream Flow Control Structures	Release Interim and Restoration flows from Friant Dam up to full Restoration Flows stipulated by Settlement, as constrained by then-existing channel capacities	✓	✓	✓	✓	✓	✓	Project
	Minimize increases in flood risk in the Restoration Area due to release ~~as a result~~ of Interim and Restoration flows	✓	✓	✓	✓	✓	✓	
	~~Reo~~Operate downstream flow control structures	✓	✓	✓	✓	✓	✓	
	Establish an RWA and manage Friant Dam to make water supplies available to Friant Division long-term contractors at a preestablished rate	✓	✓	✓	✓	✓	✓	
Recapture Interim and Restoration Flows	Recapture Interim and Restoration flows in Restoration Area at Mendota Pool and wildlife refuge	✓	✓	✓	✓	✓	✓	
	Recapture Interim and Restoration flows in Delta at existing CVP/SWP facilities	✓	✓	✓	✓	✓	✓	
	Recapture Interim and Restoration flows at existing facilities on San Joaquin River with potential in-district modifications to existing facilities			✓	✓	✓	✓	Program
	Construct and operate new pumping infrastructure on San Joaquin River					✓	✓	
Recirculate Recaptured Interim and Restoration Flows	Recirculate recaptured Interim and Restoration flows	✓	✓	✓	✓	✓	✓	

Table 2-2.
NEPA/CEQA Level of Compliance for Actions Included Under Action Alternatives (contd.)

Category	Action	Action Alternative						Level of NEPA/CEQA Compliance
		A1	A2	B1	B2	C1	C2	
Common Restoration Actions	Construct Mendota Pool Bypass and modify Reach 2B to convey at least 4,500 cfs	✓	✓	✓	✓	✓	✓	
	Modify Reach 4B1 to convey at least 475 cfs	✓	✓	✓	✓	✓	✓	
	Modify San Joaquin River Headgate Structure to enable fish passage and flow routing	✓	✓	✓	✓	✓	✓	
	Modify Sand Slough Control Structure to enable fish passage	✓	✓	✓	✓	✓	✓	
	Screen Arroyo Canal and provide fish passage at Sack Dam	✓	✓	✓	✓	✓	✓	
	Modify Eastside and Mariposa Bypasses for fish passage	✓	✓	✓	✓	✓	✓	
	Enable deployment of seasonal barriers at Mud and Salt sloughs	✓	✓	✓	✓	✓	✓	
	Modify Chowchilla Bypass Bifurcation Structure	✓	✓	✓	✓	✓	✓	
	Fill or isolate gravel pits	✓	✓	✓	✓	✓	✓	
	Reintroduce salmon	✓	✓	✓	✓	✓	✓	
	Enhance spawning gravel	✓	✓	✓	✓	✓	✓	
	Reduce potential for redd superimposition and/or hybridization	✓	✓	✓	✓	✓	✓	
	Supplement the salmon population	✓	✓	✓	✓	✓	✓	
	Modify floodplain and side-channel habitat	✓	✓	✓	✓	✓	✓	
	Enhance in-channel habitat	✓	✓	✓	✓	✓	✓	
	Reduce potential for aquatic predation of juvenile salmonids	✓	✓	✓	✓	✓	✓	
	Reduce potential for fish entrainment	✓	✓	✓	✓	✓	✓	
	Enable fish passage	✓	✓	✓	✓	✓	✓	
	Modify flood flow control structures	✓	✓	✓	✓	✓	✓	

Table 2-2.
NEPA/CEQA Level of Compliance for Actions Included Under Action Alternatives (contd.)

Category	Action	Action Alternative						Level of NEPA/CEQA Compliance
		A1	A2	B1	B2	C1	C2	
Actions in Reach 4B1 to Provide at Least 4,500 cfs Capacity	Modify Reach 4B1 to convey at least 4,500 cfs		✓		✓		✓	Program
Physical Monitoring and Management Plan	Monitoring actions[1]	✓	✓	✓	✓	✓	✓	
	Immediate management actions	✓	✓	✓	✓	✓	✓	Project
	Long-term management actions	✓	✓	✓	✓	✓	✓	Program
Conservation Strategy	Various conservation measures, applied to actions above	✓	✓	✓	✓	✓	✓	Project and Program

Note:
[1] Site-specific documentation has been prepared for monitoring actions completed or currently underway, and would be prepared, as necessary, for actions described at a program-level of detail in this Draft PEIS/R.

Key:
CEQA = California Environmental Quality Act
cfs = cubic feet per second
CVP = Central Valley Project
Delta = Sacramento-San Joaquin Delta
NEPA = National Environmental Policy Act
PEIS/R = Program Environmental Impact Statement/Report
Restoration Area = San Joaquin River from Friant Dam to the Merced river confluence
RWA = Recovered Water Account
Settlement = Stipulation of Settlement, *NRDC et al., v. Kirk Rodgers, et al*.
SWP = State Water Project

Page 2-15, line 5:

Restoration ~~F~~flows in the Delta, are constrained by established regulatory and

Page 2-15, lines 11-13:

Recapture of Interim and Restoration flows in the Restoration Area at Mendota Pool, ~~and~~ the ~~East Bear Creek~~ Lone Tree Unit of the ~~San Luis~~ Merced National Wildlife Refuge (NWR) (Lone Tree Unit), and the East Bear Creek Unit of the San Luis NWR (East Bear Creek Unit)

Page 2-21, lines 13-16:

The release and conveyance of full Restoration Flows is defined for the purpose of this document as meeting Restoration Flow targets at six locations in the Restoration Area identified in Exhibit B of the Settlement, and in consultation with the RA, the six locations are as follows:

Page 2-21, line 21:

- **Head of Reach ~~3~~2B** – Immediately below the Chowchilla Bypass Bifurcation

Page 2-22, line 6:

periods, as described in Exhibit B of the Settlement; the use of up to an additional 10

Page 2-22, lines 12-14:

Exchange Contract), dated February 14, 1968. Under the terms and conditions of that contract, Reclamation is obligated to deliver water ~~to make available required deliveries~~ from the Delta-Mendota Canal (DMC) or other sources to the San Joaquin River Exchange Contractors ~~or releases from Millerton Reservoir~~. If Reclamation is temporarily unable to do so, water is to be delivered from the San Joaquin River in accordance with Article 4.b. of the San Joaquin River Exchange Contract. If Reclamation is permanently unable to deliver water from the DMC or other sources, the San Joaquin River Exchange Contractors shall receive water from the San Joaquin River in accordance with Article 4.c. of the San Joaquin River Exchange Contract. If Reclamation makes

Page 2-22, line 30:

Minimize Increases in Flood Risk in the Restoration Area due to the Release of ~~from~~ Interim and Restoration Flows. Throughout Settlement

Page 2-22, line 32:

flows to be released would be maintained at or below ~~limited to~~ then-existing channel capacities. As channel or

Page 2-22, line 36:

Interim and Restoration ~~F~~flows would be reduced, as needed, to address material seepage impacts, as

Page 2-23, line 23:

- **Maintain Interim and Restoration Flows at or Below Estimates of Then-Existing**

Page 2-23, lines 33-41:

Only limited data are currently available on San Joaquin River channel capacities and levee conditions. The levee design criteria developed by U.S. Army Corps of Engineers (USACE) and presented in *Design and Construction of Levees Engineering and Design Manual* (Manual No. 1110-2-1913) (USACE 2000), *Engineering Manual: Slope Stability* (Manual No. 1110-2-1902) (USACE 2003), and *Design Guidance for Levee Underseepage* (Engineering Technical Letter No. 1110-2-569) (USACE 2005) would be applied throughout the Restoration Area to identify the Interim or Restoration flows that would not cause the levee slope stability ~~“~~Factor of Safety~~”~~ to be reduced below 1.4, or the underseepage Factor of Safety to be reduced below the value corresponding to an exit gradient at the toe of the levee of 0.5. The levee slope stability Factor of Safety is defined as the ratio of available shear strength of the top stratum of the levee slope to the necessary shear strength to keep the slope stable (USACE 2003), and minimum levee slope stability factors of safety are given by~~, as calculated using~~ USACE levee criteria shown in Table 2-6. The application of the levee slope stability Factor of Safety of 1.4 is required for federally authorized flood control projects. Through-seepage is calculated as part of the slope stability analysis and does not have a separate Factor of Safety~~. As defined by USACE, t~~ The underseepage Factor of Safety is defined as a ratio of the critical hydraulic gradient to the actual exit gradient of seepage on the levee ~~equal to one over the exit gradient, as measured at the toe of the levee (2000)~~. USACE design guidance recommends that the allowable underseepage factor of safety for use in evaluations and/or design of seepage control measures should correspond to an exit gradient at the toe of the levee of 0.5 (in general, this would provide a Factor of Safety of 1.6), but states that deviation from recommended design guidance is acceptable when based and documented on sound engineering judgment and experience (USACE 2005).

Page 2-24, lines 3-11:

Until adequate data are available to determine the Factors of Safety, Reclamation would limit the release of Interim and Restoration flows to those which would remain in-channel. In-channel flows are flows that maintain a water surface elevation at or below the elevation of the landside levee toe (i.e., the base of the levee). When sufficient data are available to determine the Factors of Safety, Reclamation would limit Interim and Restoration flows to levels that would correspond to a levee slope stability Factor of Safety of 1.4 or higher and an underseepage Factor of Safety corresponding to an exit gradient at the toe of the levee of 0.5 or lower at all times. Observation of levee erosion, seepage, boils, impaired emergency levee access, or other indications of increased flood risk identified through ongoing monitoring at potential erosion sites would indicate that the minimum Factors of Safety are~~is~~ not met and

Page 2-24, line 16:

downstream reaches is described in Section 2.4.3. All project- and program-level actions would be performed in compliance with USACE requirements, including requirements set forth by USACE as conditions of permits issued for implementation of such actions (see Chapter 28.0, “Consultation, Coordination, and Compliance,” for a description of the needed permits, petitions, compliance documents, etc. for the project- and program-level actions).

Page 2-25, line 1:

criteria. The Channel Capacity Advisory Group would provide~~be responsible for providing~~

Page 2-25, lines 36-39:

that~~which~~ would remain in-channel, as described below. When sufficient data are available to determine the Factors of Safety, Reclamation would limit the release of Interim and Restoration ~~F~~flows to those flows that~~which~~ would maintain standard USACE levee performance criteria (i.e., a levee slope stability Factor of Safety of at least 1.4 and an underseepage Factor of Safety corresponding to an exit gradient at the toe of the levee of 0.5 or less) at all times.

Page 2-26, line 9:

capacities that maintain~~ a~~ minimum Factors of Safety for levees under saturated conditions

Page 2-26, lines 15-30:

Factors of Safety ~~are inversely related to the exit gradient, and~~ describe the potential for unsafe conditions to occur. Underseepage Factors of Safety are inversely related to the exit gradient of seepage on the levee. The exit gradient is the hydraulic gradient at which water leaves the soil surface under saturated conditions, and is a function of both structural design and hydrogeologic conditions. At a critical exit gradient, soil particles may move with water, resulting in unsafe conditions such as piping and boils (Craig 1997, USACE 2000). USACE design guidance recommends that the allowable underseepage Factor of Safety for use in evaluations and/or design of seepage control measures should correspond to an exit gradient at the landside toe of the levee of 0.5. In general, this would provide an underseepage Factor of Safety of about 1.6 (USACE 2005). ~~USACE recommends a Factor of Safety of 1.4 or greater for levees under a steady state of saturation for a prolonged time, such as occurs during flood conditions or with prolonged flows. Maintaining the USACE levee performance criteria for levees under a~~

~~steady state of saturation would be the key levee performance criteria for maintaining flood risks at less-than-significant levels.~~

~~Systematic levee condition monitoring would be implemented as described in more detail in Appendix D, "Physical Monitoring and Management Plan." Observation of seepage or boils at the landside levee toe or evidence of levee erosion would indicate that the minimum underseepage Factor of Safety is not met. Such observations would supersede channel capacity estimates, and Interim and Restoration flows would be immediately reduced, redirected, or diverted in areas where these conditions occur (see Section 2.3.4).~~

Levee slope stability Factors of Safety are determined as the ratio of available shear resistance to that required for equilibrium. Available shear resistance is the capacity of the levee slope materials to maintain static equilibrium. A Factor of Safety greater than 1.0 indicates that capacity exceeds demand and that the slope will be stable with respect to sliding along the assumed particular slip surface analyzed. A Factor of Safety less than 1.0 indicates that the slope will be unstable (USACE 2003). USACE recommends a levee slope stability Factor of Safety of 1.4 or greater for levees under a steady state of saturation for a prolonged time, such as occurs during flood conditions or with prolonged flows.

Maintaining the USACE levee Factors of Safety as described above would be the key performance criteria for reducing the risk of levee failure due to underseepage, through-seepage, and associated levee stability issues to less-than-significant levels. Systematic levee condition monitoring would be implemented as described in more detail in Appendix D, "Physical Monitoring and Management Plan." Observation of seepage or boils at the landside levee toe or evidence of levee erosion would indicate that the minimum Factors of Safety are not met. Such observations would supersede channel capacity estimates, and Interim and Restoration flows would be immediately reduced, redirected, or diverted in areas where these conditions occur until such time that seepage or boils are not observed during levee monitoring (see Section 2.3.4).

Page 2-27, lines 18-19:

Field surveys of potential erosion sites on the San Joaquin River between Friant Dam and the Merced River confluence would be conducted by Reclamation annually or on a basis as determined by Reclamation in coordination with the Channel Capacity Advisory Group. These

Page 2-27, line 28:

- Areas of channel change between 1937 and 2004 or between 19~~8~~38 and 2004

Page 2-28, line 7:

Sediment mobilization monitoring during these ~~annual~~ surveys would focus on specific

Page 2-28, line 15:

Project. Changes to the Lower San Joaquin River Flood Control Project would require USACE approval.

Page 2-29, line 16:

system, would include ~~the~~ routing Interim and Restoration flows to the Eastside or

Page 2-28, lines 29-30:

the ~~existing~~ operation of facilities that are part of the Lower San Joaquin River Flood Control Project (flood management system) and the Hills Ferry Barrier, but without physical, construction

Page 2-29, lines 19-31:

- **Operate and monitor Hills Ferry Barrier –** The main purpose of the Hills Ferry Barrier is to redirect upstream-migrating adult fall-run Chinook salmon into ~~suitable spawning habitat in~~ the Merced River, where suitable spawning habitat exists, and prevent migration into the main stem San Joaquin River upstream, where conditions are currently considered unsuitable for Chinook salmon and Central Valley steelhead. The peak adult Central Valley steelhead migration period overlaps with that of fall-run Chinook salmon, and typically occurs between October and December in the San Joaquin River basin. Because their body type is similar to salmon, Central Valley steelhead would be expected to be redirected by the barrier in a similarly effective manner. Under historical operations, the Hills Ferry Barrier is operated September through mid-December. The period of operation under this measure may vary from historical operations, and may require modifications to existing or future permits. Operations and maintenance of the Hills Ferry Barrier would continue for the purpose of redirecting Chinook salmon and, incidentally, Central Valley steelhead until sufficient habitat and channel improvements to support salmonids are completed~~.~~, and Reclamation would continue to implement and adapt the *Central Valley Steelhead (*Oncorhynchus mykiss*) Monitoring Plan for the San Joaquin River Restoration Program* (SJRRP 2011) (Steelhead Monitoring Plan), in coordination with NMFS. Under the Steelhead Monitoring Plan, the presence of steelhead upstream from Hills Ferry Barrier is monitored. If steelhead are detected, they would be collected and relocated downstream from the Merced River confluence. The Steelhead Monitoring Plan applies to Interim and Restoration flows and would not be implemented in flood flow conditions.

Page 2-31, lines 6-8:

provides that recapture and recirculation of Interim and Restoration ~~F~~flows "shall have no adverse impact on the Restoration Goal, downstream water quality or fisheries~~,~~." ~~Because~~ In the event that recapture within the Restoration Area ~~c~~would prevent the flow targets from being met,

Page 2-31, line 16-17:

recapture of Interim and Restoration flows include the Mendota Pool, the Lone Tree Unit located in Eastside Bypass Reach 2, and the East Bear Creek Unit located in Eastside Bypass Reach 3. Only diversion facilities that have

Page 2-31, line 27:

contractors who are not parties to the Settlement~~included in the action alternatives~~. As previously described,

Page 2-32, lines 8-15:

Restoration flows could be diverted to the Lone Tree Unit in Eastside Bypass Reach 2, or to the East Bear Creek Unit in Eastside Bypass Reach 3, to the extent that these flows would meet water supply demands. The Lone Tree Unit has historically diverted water from Eastside Bypass Reach 2 using a 25-horsepower permanent lift station last operated in 1997 (Forrest, pers. comm., 2009). The Lone Tree Unit currently diverts water from the Eastside Bypass using a 350-horsepower portable pump. The pumps are ordinarily operated in conjunction with weirs to back up water in the bypass to provide temporary habitat for waterfowl. To maintain suitable conditions within the ponded water, flow-through is maintained past the weirs. The East Bear Creek Unit has a pump lift station in the Eastside Bypass with a diversion capacity of 60 cfs. This pump station includes a 48-inch-diameter intake structure and four 125-horsepower electric motors driving 15 cfs pumps. Deliveries of Interim and/or Restoration Flows to the East Bear Creek Unit would be further constrained by actual demand for water supplies at the units. Currently, the East Bear Creek Unit receives CVP water supplies from the DMC.

Page 2-36, line 16:

therefore described at a program level in this Draft PEIS/R. This Draft PEIS/R does not evaluate the direct discharge of water from south-of-Delta facilities into the Friant-Kern Canal at a project level of detail. If discharge of water from south-of-Delta facilities into the Friant-Kern Canal is proposed as part of the Recapture and Recirculation Plan, it would require further review pursuant to NEPA and/or CEQA.

Page 2-36, line 36:

Paragraph 13(i) also specifies the release of~~the~~ water from Friant ~~d~~Dam during times of the

Page 2-39, line 2:

engineering concepts and information from the Fisheries~~y~~ Management Plan (Appendix E).

Page 2-40, lines 18-22:

stipulates required channel modifications in Reach 4B to convey at least 475 cfs. ~~The Act (Section 10009(f)(2)(B)) requires that a determination be made on increasing the channel capacity to 4,500 cfs before undertaking any "substantial construction" in Reach 4B1. Therefore, modifications in Reach 4B1 to convey at least 475 cfs would not include substantial construction, such as changes to existing levees in Reach 4B1.~~ Based on

Page 2-42, lines 3-5:

downstream fish passage for a range of flows of up to 4,500 cfs. ~~Modifications would allow the structure to handle 8,500 cfs while not increasing upstream water levels from existing conditions.~~

Page 2-42, lines 14-19:

Enable Deployment of Seasonal Barriers at Mud and Salt Sloughs. Potential false migration pathways to migrating adult salmon ~~may be~~ are present in Mud and Salt sloughs, tributaries to Reach 5. Modifications to Mud and Salt sloughs would be made to enable the deployment of barriers on these sloughs to prevent adult salmon from entering these ~~potentially~~ false migration pathways, consistent with Paragraph 11(a)(10) of the ~~s~~Settlement.

Page 2-42, line 27:

leaving them stranded. Fish could also enter the Chowchilla Bypass when future flood control releases are routed to the bypass. To address potential stranding of fish in the Chowchilla Bypass,

Page 2-43, lines 13-36:

of salmon, the Fisheries M~~a m~~anagement P~~p~~lan (Appendix E) has been developed to help guide implementation of Restoration actions. The range of potential actions for salmon reintroduction spans from reintroducing only spring-run Chinook salmon to reintroducing both fall-run and spring-run Chinook salmon, and could include one or more life stages. Broodstocks would be identified through subsequent studies, and because of the uncertainty associated with broodstock life history, behavioral, and adaptive traits of potential broodstock in the Central Valley, it is most likely that broodstocks would be acquired from a variety of watersheds.

The range of potential actions for salmon reintroduction could also include the use of the existing San Joaquin Hatchery, another existing hatchery, or a new hatchery. ~~Although the design and capacity of a~~ A new hatchery would be determined in part by management plans, a new hatchery could potentially provide for initial reintroduction of spring-run Chinook salmon, fall-run Chinook salmon, and/or other native fish. Hatchery use would be phased out over time as the fish population is reestablished. The Restoration Goal and Paragraph 14 of the Settlement emphasize the need to restore self-sustaining fish populations. Therefore, hatchery populations alone would not fulfill the Restoration Goal~~,~~

~~and naturally reproduced individuals would need to be distinguished from hatchery-produced individuals~~.

This Draft PEIS/R identifies potential system effects associated with reintroducing salmon. USFWS submitted a 10(a)~~(1)~~(A~~a~~) Enhancement of Species Permit application to NMFS on September 30, 2010, for introducing an experimental population of spring-run Chinook salmon, consistent with the schedule identified in the Settlement. NMFS will issue a final rule pursuant to Section 10(j) of the Federal Endangered Species Act of 1973 (ESA), as amended~~, by April 30, 2012~~. Specific environmental effects related to the

Page 2-43, lines 38-39:

project-specific NEPA ~~analysis, and possibly~~ and CEQA analysis, in compliance with an associated Special Rule authorizing the experimental population.

Page 2-44, lines 1-2:

Enhance Spawning Gravel. Adult Chinook salmon require suitable gravels, refuge, water depths, temperatures, and velocities for spawning. The range of potential actions to provide for

Page 2-44, line 8:
with clean, spawning-sized gravel at some of, or a portion of, the existing spawning

Page 2-45, lines 29-30:

spatially and temporally. Levee alignments outside of Reaches 2B and 4B1 would not be modified for the sole purpose of creating or enhancing additional floodplain habitat. Modifications to create and/or enhance floodplain habitat could occur outside of the existing levee alignments if levee alignments are modified for other purposes and designed to accommodate that habitat. ~~Modifications would be confined within the existing levee alignment.~~ This action also includes floodplain modifications in reaches

Page 2-46, lines 7-22:

- **Reduce sand transport –** The quantity of sand in Reaches 1 and 2 may present challenges to channel stability, and the function of hydraulic control structures and road crossings. This sand has the potential to be mobilized by Interim and Restoration flows to lower reaches that do not currently have sediment transport-related issues. This action would control sources of sand in Reach 1, and transport of sand in or to downstream river and bypass reaches, to prevent or reduce hydraulic and facilities challenges arising from channel migration, aggradation, or degradation. Control of sediment at tributary sources could include settling basins, bed stabilization (such as floodplain widening to reduce sediment transport potential) in areas where the bed is degrading, and bank stabilization in meandering reaches. In-channel sand could be removed by dredging or by constructing instream sediment detention basins, or sand traps, to capture sand. Accumulated sand would ~~need to~~ be removed periodically to maintain the functionality of sand traps. As previously described, portions of Reach 1 may benefit from modifications to gravel quantities and mobility.

Enhance In-Channel Habitat. This action ~~c~~would incorporate channel modifications to

Page 2-49, lines 26-36:

activities that~~which~~ apply to one or more of the component plans. The five component plans include the following:

- **Flow –** To ensure compliance with the hydrograph releases, flow targets, and any other applicable flow releases (e.g., Buffer Flows) in Exhibit B of the Settlement ~~and any other applicable flow releases (e.g., Buffer Flows)~~
- **Seepage –** Reduce or avoid adverse or undesirable seepage impacts
- **Channel capacity** – Maintain flood conveyance capacity
- **Native vegetation –** Establish and maintain native riparian habitat
- **Spawning gravel –** Maintain gravels for spawning

The Physical Monitoring and Management Plan includes monitoring activities and a set of immediate (project level) responses that would be implemented, as needed, to attain the management objectives. The plan also identifies potential long-term (program-level)

Page 2-49, line 40:

~~F~~E, "Fisheries Management Plan."

Page 2-51, lines 28-35:

- **Channel capacity** – Removal of vegetation and debris that would cause Interim or Restoration flows to exceed channel capacity or lead to an increase in water surface elevation during flood events. Vegetation would be removed by mechanical or chemical means. Nonnative plant removal would receive priority over removal of native species
- **Spawning gravel –** Modify releases from Friant Dam to adjust flows to flush or mobilize based on monitoring reports and recommendations of spawning gravel conditions (including potential modifications to Restoration Flow Guidelines, consistent with Paragraph 13 of the Settlement, to improve the success of Flushing Flows).

Page 2-52, lines 11-12:

be detailed in the Restoration Flow Guidelines, a document that would be attached to the Friant Operation Guidelines (*Operational Guidelines for Water Service, Friant Division, Central Valley Project*) (Reclamation 2005).

Page 2-53, line 8:

including several ~~F~~federally listed and State-listed species. Therefore, the action

Page 2-54, line 6:

These measures address all potentially affected ~~F~~federally listed and/or State-listed

Pages 2-55 through 2-79, Table 2-7:

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
VP	**Vernal pool habitats, fleshy (succulent) owl's clover, Hoover's spurge, Bogg's Lake hedge-hyssop, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and western spadefoot toad**		
VP-1. Avoid effects to species	a) If vernal pools or vernal pool species are anticipated within a project area, a qualified biologist will identify and map vernal pool and seasonal wetland habitat potentially suitable for listed vernal pool plants, invertebrates, and western spadefoot toad within the project footprint. b) Facility construction and other ground-disturbing activities will be sited to avoid core areas identified in the *Vernal Pool Recovery Plan* (USFWS 2005) because conservation of these areas is a high priority for recovering listed vernal pool species.	Project and Program	USFWS DFG
VP-2. Minimize effects to species	a) If vernal pools are present, a buffer around the microwatershed or a 250-foot-wide buffer, whichever is greater, will be established before ground-disturbing activities around the perimeter of vernal pools and seasonal wetlands that provide suitable habitat for vernal pool crustaceans or vernal pool plants. This buffer will remain until ground-disturbing activities in that area are completed. Suitable habitat and buffer areas will be clearly identified in the field by staking, flagging, or fencing. b) Appropriate fencing will be placed and maintained around all preserved vernal pool habitat buffers during ground-disturbing activities to prevent impacts from vehicles and other construction equipment. c) Worker awareness training and on-site biological monitoring will occur during ground-disturbing activities to ensure buffer areas are being maintained.	Program	Lead Agency

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
VP-3. Compensate for temporary or permanent loss of habitat	a) If activities occur within the microwatershed or 250-foot-wide buffer for vernal pool habitat will be affected by the SJRRP, the project proponent will develop and implement a compensatory mitigation plan, consistent with the USACE and EPA April 10, 2008, Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332 and 40 CFR Part 230) and other applicable regulations and rules at the time of implementation, that will result in no net loss of acreage, function, and value of affected vernal pool habitat. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of vernal pool habitat or purchase of credits at a mitigation bank approved by the applicable regulatory agency/agencies. b) Project effects and compensation will be determined in consideration of the *Vernal Pool Recovery Plan* goals for core areas, which call for 95 percent preservation for habitat in the Grasslands Ecological Area and Madera core areas, and 85 percent habitat preservation in the Fresno core area (USFWS 2005). c) Appropriate compensatory ratios for loss of habitat both in and out of core areas will be determined during coordination and consultation with USFWS and/or DFG, as appropriate. d) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be ~~and~~ developed as part of the USFWS and/or DFG coordination and consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase will require an endowment for land management in perpetuity before any project groundbreaking activities.	Project and Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CH	**Critical habitat**		
CH-1. Avoid and minimize effects to critical habitat	a) Designated critical habitats shall be identified and mapped. b) All SJRRP actions will be designed to avoid direct and indirect adverse modifications to these areas. c) Minimization measures, such as establishing and maintaining buffers around areas of designated critical habitat, shall be implemented if avoidance is not feasible.	Project and Program	USFWS
CH-2. Compensate for unavoidable adverse effects on Federally designated critical habitat	a) If critical habitat may be adversely modified by the implementation of SJRRP actions, the area to be modified will be evaluated by a qualified biologist to determine the potential magnitude of the project effects (i.e., description of primary constituent elements present and quantification of those affected) at a level of detail necessary to satisfy applicable environmental compliance and permitting requirements. b) Compensatory conservation measures developed through Section 7 consultation with USFWS will be implemented. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase require an endowment for land management in perpetuity before any project groundbreaking activities.	Project and Program	USFWS
CTS	**California tiger salamander**		
CTS-1. Avoid and minimize effects to species	a) If potential California tiger salamander habitat or species are anticipated within the project area, within 1 year before project construction activities, a qualified biologist shall identify and map potential California tiger salamander habitat (areas within 1.3 miles of known or potential California tiger salamander breeding habitat) within the project footprint. One week before ground-disturbing activities, a qualified biologist will survey for and flag the presence of ground squirrel and gopher burrow complexes. Where burrow complexes are present, a 250-foot-wide buffer shall be placed to avoid and minimize disturbance to the species. b) Facility construction and other ground-disturbing activities shall be sited to avoid areas of known California tiger salamander habitat and avoidance buffers. c) To eliminate an attraction to predators of the California tiger salamander, all food-related trash items such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at least once every day from the entire project site.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CTS-2. Minimize effects to species	a) Before and during construction activities, construction exclusion fencing will be installed just outside the work limit or around vernal pools where California tiger salamander may occur. This fencing shall be maintained throughout construction and will be removed at the conclusion of ground-disturbing activities. No vehicles will be allowed beyond the exclusion fencing. A USFWS- and DFG-approved biological monitor shall be present on site, during intervals recommended by USFWS and DFG, to inspect the fencing. b) The biological monitor will be on site each day during any wetland restoration or construction, and during initial site grading or development of sites where California tiger salamanders have been found. c) Before the start of work each day, the biological monitor will check for animals under any equipment to be used that day, such as vehicles or stockpiles of items such as pipes. If California tiger salamanders are present, they will be allowed to leave on their own, before the initiation of construction activities for the day. To prevent inadvertent entrapment of California tiger salamanders during construction, all excavated, steep-walled holes or trenches more than 1 foot deep shall be covered, by plywood or similar materials, at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. d) Plastic monofilament netting (erosion control matting) or similar material shall not be used at the project site because California tiger salamanders may become entangled or trapped. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds. e) All ground-disturbing work shall occur during daylight hours. Clearing and grading will be conducted between April 15 and October 15, in coordination with USFWS and DFG, and depending on the level of rainfall and site conditions. f) Revegetation of project areas temporarily disturbed by construction activities will be conducted with locally occurring native plants.	Program	USFWS DFG
CTS-3. Compensate for temporary or permanent loss of habitat	a) If California tiger salamander, or areas within 1.3 miles of known or potential California tiger salamander breeding habitat, would be affected by the SJRRP, the project proponent will develop and implement a compensatory mitigation plan in coordination with USFWS and DFG, as appropriate. Unavoidable effects will be compensated through a combination of creation, preservation, and restoration of habitat or purchase of credits at a mitigation bank approved by the regulatory agencies. b) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in and developed as part of the USFWS and/or DFG coordination and consultation process. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. Any impacts that result in a compensation purchase will require an endowment for land management in perpetuity before any project groundbreaking activities.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
DBC	**Delta button-celery**		
DBC-1. Avoid and minimize loss of habitat and individuals	a) Historically, Delta button celery was known to exist in the Eastside and Mariposa bypasses (CNDDB). In most areas of the bypasses, local flows up to 1,500 cfs remain in the main channel, and do not inundate the floodplain. Maintaining flows at or below 1,500 will not impact Delta button celery populations. In general, historical Delta button celery populations have been located below the 2,500 cfs inundation area (CNDDB). If these historical populations are still thriving in these areas, flows between 1,500 cfs and 2,500 cfs will most likely impact these populations. Potential areas of impact within the Eastside Bypass from the Sand Slough Bypass to the Mariposa Bypass are approximately 400 acres, and for the Mariposa Bypass, approximately 100 acres. Before increasing flows above 1,500 cfs in these specific areas, comprehensive surveys will be conducted.Surveys will include remapping and recensus of the documented occurrences during at least 2 consecutive or nonconsecutive years when habitat conditions are favorable to detect the species to determine the population trend. Status updates for these occurrences will be provided to DFG. b) A Delta button-celery conservation plan will be developed and implemented that includes a preservation and adaptive management strategy for existing occurrences within the Restoration Area. The conservation plan will be developed in collaboration with DFG and other species experts, and be supported by review of the existing literature, including information on species' life history characteristics, historic and current distribution, and microhabitat requirements.	Project and Program	DFG
DBC-2. Avoid and minimize loss of habitat and risk of take for implementation of construction activities	a) If direct impacts to Delta button celery could occur, DFG and the appropriate State lead agency will coordinate to determine specific minimization and mitigation measures	Program	Lead Agency

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
DBC-3. Compensate for temporary or permanent loss of habitat	a) Compensatory mitigation for Delta button-celery will be developed in consultation with DFG. Mitigation may include the development and implementation of habitat creation and enhancement designs to incorporate habitat features for Delta button-celery (e.g., depressions within seasonally inundated areas) into floodplains with potentially suitable habitat conditions. Compensatory mitigation may also include efforts to establish additional populations in the Restoration Area or to enhance existing populations on or off site. Mitigation sites will avoid areas where future SJRRP activities are likely. The project proponent will obtain site access through a conservation easement or in-lieu fee title and will provide adequate funding to implement the required compensation measures, and to monitor compliance with and success of the conservation measures. b) Establishment of new occurrences will be attempted by transplanting seed and plants from affected locations to created habitat or suitable, but unoccupied, existing habitat. c) Monitoring, performance criteria, and protective measures will be applied to compensatory mitigation sites. The replacement requirements, and any additional conservation and mitigation measures will be determined in coordination with DFG.	Project and Program	DFG
PALM	**Palmate-bracted bird's beak**		
PALM-1. Avoid and minimize effects to species	a) If palmate-bracted bird's beak is anticipated within the project area, a qualified botanist will identify and map the location of palmate-bracted bird's beak plants within the project footprint, within 1 year before the start of activities that may cause disturbance from either release of flows over 1,660 cfs or from ground-disturbing actions. b) A minimum 500-foot-wide buffer shall be placed around occurrences of palmate-bracted bird's beak during construction activities, consistent with recommendations in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The 500-foot-wide buffer will be clearly identified in the field by staking, flagging, or fencing. Project activity will avoid buffer areas, and work awareness training and biological monitoring will be conducted to ensure that the buffer area is not encroached on and that effects are being avoided.	Project and Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PALM-2. Compensate for temporary or permanent loss of occupied habitat	a) A compensatory conservation plan shall be developed in coordination with USFWS and DFG, as appropriate. The conservation plan will require the project proponent to maintain viable plant populations in the Restoration Area and will identify compensatory measures for any populations affected. The conservation plan shall include monitoring and reporting requirements for populations to be preserved in or adjacent to construction areas, or populations to be protected or enhanced off site. b) If relocation efforts are part of the conservation plan, the plan will include details on the methods to be used: collection, relocation/transplant potential, storage, propagation, preparation of receptor site, installation, long-term protection and management, monitoring and reporting requirements, and remedial action responsibilities should the initial effort fail to meet compensation requirements. c) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the conservation plan and must occur with full endowment for management in perpetuity before groundbreaking. The plan will include information on responsible parties for long-term management, holders of conservation easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Project and Program	USFWS DFG
VELB	**Valley elderberry longhorn beetle**		
VELB-1. Avoid and minimize effects to species	a) If elderberry shrubs and valley elderberry longhorn beetle are anticipated within the project area, within 1 year before the commencement of ground-disturbing activities, a qualified biologist shall identify any elderberry shrubs in the project footprint. Qualified biologist(s) will survey potentially affected shrubs for valley elderberry longhorn beetle exit holes in stems greater than 1 inch in diameter. b) If elderberry shrubs are found on or adjacent to the construction project site, a 100-foot-wide avoidance buffer – measured from the dripline of the plant – will be established around all elderberry shrubs with stems greater than 1 inch in diameter at ground level and will be clearly identified in the field by staking, flagging, or fencing. No activities will occur within the buffer areas and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Project and Program	USFWS

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
VELB -2. Compensate for temporary or permanent loss of habitat	a) The project proponent will consult with USFWS to determine appropriate compensation ratios. Compensatory mitigation measures will be consistent with the *Conservation Guidelines for Valley Elderberry Longhorn Beetle* (USFWS 1999a), or current guidance. b) Compensatory mitigation for adverse effects may include transplanting elderberry shrubs during the dormant season (November 1 to February 15), if feasible, to an area protected in perpetuity, as well as required additional elderberry and associated native plantings and approved by USFWS. c) If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Project and Program	USFWS
BNLL	**Blunt-nosed leopard lizard**		
BNLL-1. Avoid and minimize effects to species	a) Three areas have been identified as having potential blunt-nosed leopard lizard habitat based on aerial maps. These areas include approximately 2,460 acres along the southwest side of the San Joaquin River in Reach 2, approximately 490 acres in a portion of the Eastside Bypass and adjacent lands near Reach 4A of the San Joaquin River, and approximately 2,938 acres encompassing the northern side of the Mariposa Bypass and parcels north of the Mariposa Bypass and west of the Eastside Bypass. Within 1 year before the commencement of the proposed project, focused site visits and habitat assessment will be conducted on these lands. Based on focused assessment, and discussions with the USFWS and DFG, protocol-level surveys may be conducted. If blunt-nosed leopard lizard are detected within or adjacent to the project site, measures that will avoid direct take of this species will be developed in cooperation with USFWS and DFG and implemented before ground disturbing activities. ~~(DWR 2010).~~	Project and Program	USFWS DFG
BNLL-2. Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with USFWS and DFG as appropriate.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PLANTS	**Other special-status plants**		
PLANTS-1. Avoid and minimize effects to special-status plants	a) Within 1 year before the commencement of ground-disturbing activities, habitat assessment surveys for the special-status plants listed in Table 1 of Appendix L of this Draft PEIS/R, “Biological Resources – Vegetation and Wildlife,” will be conducted by a qualified botanist, in accordance with the most recent USFWS and DFG guidelines and at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. b) Locations of special-status plant populations will be clearly identified in the field by staking, flagging, or fencing a minimum 100-foot-wide buffer around them before the commencement of activities that may cause disturbance. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. c) Some special-status plant species are annual plants, meaning that a plant completes its entire life cycle in one growing season. Other special-status plant species are perennial plants that return year after year until they reach full maturity. Because of the differences in plant life histories, all general conservation measures will be developed on a case-by-case basis and will include strategies that are species- and site-specific to avoid impacts to special-status plants.	Program	USFWS DFG
PLANTS-2. Compensate for temporary or permanent loss of special-status plants	a) USFWS and/or DFG will be consulted to determine appropriate compensation measures for the loss of special-status plants, as appropriate. b) Appropriate mitigation measures may include the creation of off-site populations through seed collection or transplanting, preservation and enhancement of existing populations, restoration or creation of suitable habitat, or the purchase of credits at a regulatory-agency-approved mitigation bank. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
GGS	**Giant garter snake**		
GGS-1. Avoid and minimize loss of habitat for giant garter snake	a) If giant garter snake habitat is anticipated to be present within the project area, preconstruction surveys will be completed by a qualified biologist approved by USFWS and DFG within a 24-hour period before any ground disturbance of potential giant garter snake habitat. If construction activities stop on the project site for a period of 2 weeks or more, a new giant garter snake survey will be completed no more than 24 hours before the restart of construction activities. Avoidance of suitable giant garter snake habitat, as defined by USFWS (USFWS 1993) and DFG, will occur by demarcating and maintaining a 300-foot-wide buffer around these areas. b) For projects within potential giant garter snake habitat, all activity involving disturbance of potential giant garter snake habitat will be restricted to the period between May 1 and October 1, the active season for giant garter snakes. The construction site shall be reinspected if a lapse in construction activity of 2 weeks or greater has occurred. c) Clearing will be confined to the minimal area necessary to facilitate construction activities. Giant garter snake habitat within or adjacent to the project will be flagged, staked, or fenced and designated as an Environmentally Sensitive Area. No activity shall occur within this area, and USFWS-approved worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. Construction activities shall be minimized within 200 feet of the banks of giant garter snake habitat. Movement of heavy equipment will be confined to existing roadways to minimize habitat disturbance. d) Vegetation shall be hand-cleared in areas where giant garter snakes are suspected to occur. Exclusionary fencing with one-way exit funnels shall be installed at least 1 month before activities to allow the species to passively leave the area and to prevent reentry into work zones, per USFWS and/or DFG guidance. e) If a giant garter snake is found during construction activities, USFWS, DFG, and the project's biological monitor will immediately be notified. The biological monitor, or his/her assignee, will stop construction in the vicinity of the find and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed. Escape routes for giant garter snake should be determined in advance of construction and snakes will be allowed to leave on their own. If a giant garter snake does not leave on its own within 1 working day, USFWS and DFG will be consulted. f) All construction-related holes shall be covered to prevent entrapment of individuals. Where applicable, construction areas shall be dewatered 2 weeks before the start of activities to allow giant garter snakes and their prey to move out of the area before any disturbance.	Program	Lead Agency USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
GGS-2. Compensate for temporary or permanent loss of habitat	a) Temporarily affected giant garter snake aquatic habitat will be restored in accordance with criteria listed in the USFWS *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat* (Appendix A to Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake Within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California (USFWS 1997)), or the most current criteria from USFWS or DFG. b) Permanent loss of giant garter snake habitat will be compensated at a ratio and in a manner consulted on with USFWS and DFG. Compensation may include preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at a regulatory-agency-approved mitigation bank in sufficient quantity to compensate for the effect. Credit purchases, land preservation, or land enhancement to minimize effects to giant garter snakes should occur geographically close to the impact area. If off-site compensation is chosen, it shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	USFWS DFG
WPT	**Western pond turtle**		
WPT-1. Avoid and minimize loss of individuals	a) A qualified biologist will conduct surveys in aquatic habitats to be dewatered and/or filled during project construction. Surveys will be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If western pond turtles are found, the biologist will capture them and move them to nearby USFWS- and/or DFG-approved areas of suitable habitat that will not be disturbed by project construction.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EAGLE	**Bald eagle and golden eagle**		
EAGLE-1. Avoid and minimize effects to bald and golden eagles (as defined in the Bald and Golden Eagle Protection Act)	a) Surveys for bald and golden eagle nests will be conducted within 2 miles of any proposed project within areas supporting suitable nesting habitat and important eagle roost sites and foraging areas. These surveys will be conducted in accordance with the USFWS *Protocol for Evaluating Bald Eagle Habitat and Populations in California* and DFG *Bald Eagle Breeding Survey Instructions* or current guidance (*USFWS Draft Project Design Criteria and Guidance for Bald and Golden Eagles)*. b) If an active eagle's nest is found, project disturbance will not occur within ½ mile of the active nest site during the breeding season (typically December 30 to July 1) or any project disturbance if it is shown to disturb the nesting birds. A no-disturbance buffer will be established around the nest site for construction activities in consultation with USFWS and DFG, and will depend on ecological factors, including topography, surrounding vegetation, nest height, and distance to foraging habitat, as well as the type and magnitude of disturbance. c) Project activity will not occur within the ½-mile-buffer areas, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	USFWS DFG
SWH	**Swainson's hawk**		
SWH-1. Avoid and minimize impacts to Swainson's Hawk	a) Preconstruction surveys for active Swainson's hawk nests will be conducted in and around all potential nest trees within 0.5 miles of project-related disturbance (including construction-related traffic).~~.~~ These surveys will be conducted in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000) or current guidance. b) If known or active nests are identified through preconstruction surveys or other means, a ½ mile no-disturbance buffer shall be established around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). c) Worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SWH-2. Compensate for loss of nest trees and foraging habitat	a) If foraging habitat for Swainson's hawk is removed in association with project implementation, foraging habitat compensation will occur in coordination with DFG. Foraging habitat mitigation may consist of planting and establishing alfalfa, row crops, pasture, or fallow fields. b) If potential nesting trees are to be removed during construction activities, removal will take place outside of Swainson's hawk nesting season, and the project proponent will develop a plan to replace known Swainson's hawk nest trees with a number of equivalent native trees that were previously determined to be impacts through consultation with DFG. Compensation shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	Program	DFG
RAPTOR	**Other nesting raptors**		
RAPTOR-1. Avoid and minimize loss of individual raptors	a) Construction activity, including vegetation removal, will only occur outside the typical breeding season for raptors (September 16 to December 31~~February 14~~), if raptors are determined to be present. b) Preconstruction surveys will be conducted by a qualified biologist in areas of suitable habitat to identify active nests in the project footprint. c) If active nests are located in the project footprint, a no-disturbance buffer will be established until a qualified biologist determines that the nest is no longer active. The size of the buffer shall be established by a qualified biologist in coordination with DFG based on the sensitivity of the resource, the type of disturbance activity, and nesting stage. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	Program	DFG
RAPTOR-2. Compensate for loss of nest trees	a) Native trees removed during project activities will be replaced with an appropriate number of native trees, in coordination with DFG.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
RNB	**Riparian Nesting Birds: Western Yellow-Billed Cuckoo, Least Bell's Vireo, and Willow Flycatcher**		
RNB-1. Avoid effects to species for implementation of the SJRRP	a) If western yellow-billed cuckoo, least Bell's vireo, or willow flycatcher (*Expidonax traillii ssp*.) are anticipated within a project area, a qualified biologist shall make an initial site visit to determine if suitable habitat for the species may exist within the project footprint. b) Where suitable habitat may be present, reconnaissance-level surveys would be conducted by biologists adhering to guidance offered in Halterman et al, May 2009, *Western Yellow-billed Cuckoo Natural History Summary and Survey Methodology*; and *Least Bell's Vireo Survey Guidelines*, USFWS, January 19, 2001; or Bombay et al, May 29, 2003 for willow flycatcher.		
RNB-2. Avoid, minimize, and compensate for effects to species for implementation of the SJRRP	b) If western yellow-billed cuckoo, least Bell's vireo, or willow flycatcher are detected or suspected to be present in the project footprint, information would be collected according to the guidelines stated in RNB-1(b). USFWS and DFG would be contacted to determine the approach for avoidance, minimization, or compensation.		
MBTA	**Other birds protected by the Migratory Bird Treaty Act**		
MBTA-1. Avoid and minimize effects to species	a) Native nesting birds will be avoided by not conducting project activity, including vegetation removal, during the typical breeding season (February 1 to September 1), if species covered under the Migratory Bird Treaty Act and Fish and Game Code Sections 3503, 3503.5, and 3513 are determined to be present. b) An Avian Protection Plan shall be established in coordination with USFWS and DFG. Any overhead utility companies within the project area, whose lines, poles, or towers may be moved in association with the project, will also be consulted as part of the Avian Protection Plan.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
BRO	**Burrowing owl**		
BRO-1. Avoid loss of species	a) Preconstruction surveys for burrowing owls will be conducted in areas supporting potentially suitable habitat and within 30 days before the start of construction activities. If ground-disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed. These surveys and mitigation will be conducted in accordance with the Burrowing Owl Survey Protocol and Mitigation Guidelines, (The California Burrowing Owl Consortium, 1993) or current guidance. b) Occupied burrows shall not be disturbed during the breeding season (February 1 through August 31). A minimum 160-foot-wide buffer shall be placed around occupied burrows during the nonbreeding season (September 1 through January 31), and a 250-foot-wide buffer shall be placed around occupied burrows during the breeding season. Ground-disturbing activities shall not occur within the designated buffers.	Program	DFG
BRO-2. Minimize impacts to species	a) If a DFG-approved biologist can verify through noninvasive methods that owls have not begun egg-laying and incubation, or that juveniles from occupied burrows are foraging independently and are capable of independent survival, a plan shall be coordinated with DFG to offset burrow habitat and foraging areas on the project site if burrows and foraging areas are taken by SJRRP actions. Mitigation measures will be consistent with the *Staff Report on Burrowing Owl Mitigation* (DFG 2012), or current guidance. b) If destruction of occupied burrows occurs, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created. This should be done in consultation with DFG. c) Passive owl relocation techniques must be implemented. Owls should be excluded from burrows in the immediate impact zone within a 160-foot-wide buffer zone by installing one-way doors in burrow entrances. These doors shall be in place at least 48 hours before excavation to insure the owls have departed. d) The project area shall be monitored daily for 1 week to confirm owl departure from burrows before any ground-disturbing activities. e) Where possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
BAT	**Special-status bats**		
BAT-1. Avoid and minimize loss of species	a) If suitable roosting habitat for special-status bats will be affected by project construction (e.g., removal of buildings, modification of bridges), surveys for roosting bats on the project site will be conducted by a qualified biologist. The type of survey will depend on the condition of the potential roosting habitat and may include visual surveys or use of acoustic detectors. Visual surveys may consist of a daytime pedestrian survey for evidence of bat use (e.g., guano) and/or an evening emergence survey for the presence or absence of bats <u>and will include trees within ¼ mile of project construction activities</u>. The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required. b) If evidence of bat use is observed, the number and species of bats using the roost will be determined. Bat detectors may be used to supplement survey efforts. c) If roosts are determined to be present and must be removed, the bats will be excluded from the roosting site before the facility is removed. A mitigation program addressing compensation, exclusion methods, and roost removal procedures will be developed in consultation with DFG before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when a site can be confirmed to contain no bats. Exclusion efforts may be restricted during periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).	Program	DFG
BAT-2. Compensate for loss of habitat	a) The loss of each roost will be replaced, in consultation with DFG, and may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. Roost replacement will be implemented before bats are excluded from the original roost sites. Once the replacement roosts are constructed and it is confirmed that bats are not present in the original roost sites, the structure may be removed.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SJAS	**San Joaquin antelope squirrel**		
SJAS-1. Avoid and minimize loss of individuals	a) A 50-foot-wide minimum buffer shall be maintained from all small mammal burrows of suitable size for San Joaquin antelope squirrel. b) If work is to occur within the 50-foot-wide buffer, a qualified, permitted biologist shall conduct focused visual surveys for San Joaquin antelope squirrel within a 500-foot-wide buffer of the work area. These surveys shall coincide with the squirrels' most active season, April 1 to September 30, and shall be conducted only when air temperatures are between 20° to 30° C (68° to 86° F). Surveys should be conducted using daytime line transects with 10- to 30-meter spacing. Focused live trapping may also be required, in coordination with DFG. If San Joaquin antelope squirrels are observed during surveys, no vegetation or soil disturbance will be allowed within 50 feet of occupied burrows or burrow systems until the individuals are determined to no longer be occupying the area, as determined by a qualified biologist. c) Focused surveys, which may involve live trapping, may be required, in coordination with DFG, as appropriate. Additional conservation measures may be developed pending the results of surveys, and in consultation with DFG. d) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season). This timing shall be coordinated with USFWS and DFG.	Program	DFG
SJAS-2: Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with DFG, as appropriate.	Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
FKR	**Fresno kangaroo rat**		
FKR-1. Avoid and minimize effects to species	a) Preconstruction surveys will be conducted by a qualified biologist per USFWS and DFG survey methodology to determine if potential burrows for Fresno kangaroo rat are present in the project footprint. Surveys will be conducted within 30 days before ground-disturbing activities. The biologist will conduct burrow searches by systematically walking transects, which shall be adjusted based on vegetation height and topography, and in coordination with USFWS and DFG. Transects shall be used to identify the presence of kangaroo rat burrows. When burrows are found within 100 feet of the proposed project footprint, focused live trapping surveys shall be conducted by a qualified and permitted biologist, following a methodology approved in advance by USFWS and DFG. Additional conservation measures may be developed pending the results of surveys, and in consultation with USFWS and DFG. b) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December through September (Ahlborn 1999)). This timing shall be coordinated with USFWS and DFG.	Program	USFWS DFG
FKR-2. Avoid disturbance of designated critical habitat	a) Facility construction and modification and other restoration projects shall be sited to avoid primary constituent elements of designated critical habitat for Fresno kangaroo rat.	Program	USFWS DFG
FKR-3: Compensate for temporary or permanent loss of habitat or species	a) Compensation for impacts to the species, if needed, will be determined in coordination with DFG and USFWS, as appropriate.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
SJKF	**San Joaquin kit fox**		
SJKF-1. Avoid and minimize effects to species	a) A qualified biologist will conduct preconstruction surveys no less than 14 days and no more than 30 days before the commencement of activities to identify potential dens more than 5 inches in diameter. The project proponent shall implement USFWS' (1999b) *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance.* The project proponent will notify USFWS and DFG in writing of the results of the preconstruction survey within 30 days after these activities are completed. b) If dens are located within the proposed work area, and cannot be avoided during construction activities, a USFWS-approved biologist will determine if the dens are occupied. c) If occupied dens are present within the proposed work, their disturbance and destruction shall be avoided. Exclusion zones will be implemented following the latest USFWS procedures (currently USFWS 1999b). d) The project proponent will notify USFWS and DFG immediately if a natal or pupping den is found in the survey area. The project proponent will present the results of preactivity den searches within 5 days after these activities are completed and before the start of construction activities in the area. e) Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December–April (Ahlborn 2000)). This timing shall be coordinated with USFWS and DFG.	Program	USFWS DFG
SJKF-2. Compensate for loss of habitat	a) The project proponent, in coordination with USFWS and DFG, will determine if kit fox den removal is appropriate. If unoccupied dens need to be removed, the USFWS-approved biologist shall remove these dens by hand-excavating them in accordance with USFWS procedures (USFWS 1999b). b) Additional conservation measures will be coordinated with USFWS and DFG, and may include replacing dens, installing off-site artificial dens, acquiring compensation habitat, or other options to be determined. Compensation may include dedicating conservation easements, purchasing mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations. c) The project proponent will present the results of den excavations to USFWS and DFG within 5 days after these activities are completed.	Program	USFWS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
PL	**Pacific lamprey**		
PL-1. Avoid and minimize effects to species	a) A qualified biologist will conduct preconstruction surveys as outlined in Attachment A of USFWS' *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus)* (2010). b) Work in documented areas of Pacific lamprey presence will be timed to avoid in-channel work during typical lamprey spawning (March 1 to July 1). c) If temporary dewatering in documented areas of lamprey presence is required for instream channel work, salvage methods shall be implemented to capture and move ammocoetes to a safe area, in consultation with USFWS.	Program	USFWS
DS	**Delta smelt**		
DS-1. Avoid and minimize effects to species	a) All in-water work within delta smelt habitat, as defined by most recent USFWS guidance, shall be confined to a seasonal work window of August 1 - November 30, when delta smelt are least likely to be present. Because this species does not regulate its movements strictly within this time frame, modifications to the work windows may be approved by USFWS before project implementation, based on information from the various in-Delta monitoring programs. b) If activities occur within ~~D~~delta smelt habitat, measure will be taken to maintain or increase shading of suitable shallow water habitat. The project will also avoid areas deemed suitable for delta smelt habitat that have established aquatic vegetation or have not been previously disturbed.	Program	USFWS DFG
RHSNC	**Riparian habitat and other sensitive natural communities**		
RHSNC-1. Avoid and minimize loss of riparian habitat and other sensitive natural communities	a) Biological surveys will be conducted to identify, map, and quantify riparian and other sensitive habitats in potential construction areas. b) Construction activities will be avoided in areas containing sensitive natural communities, as appropriate. c) If effects occur to riparian habitat, emergent wetland, or other sensitive natural communities associated with streams, the State lead agency will comply with Section 1602 of the California Fish and Game Code; compliance may include measures to protect fish and wildlife resources during the project.	Project and Program	DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
RHSNC-2. Compensate for loss of riparian habitat and other sensitive natural communities	a) The Riparian Habitat Mitigation and Monitoring Plan for the SJRRP will be developed and implemented in coordination with DFG. Credits for increased acreage or improved ecological function or riparian and wetland habitats resulting from the implementation of SJRRP actions will be applied as compensatory mitigation before additional compensatory measures are required. b) If losses of other sensitive natural communities (e.g., recognized as sensitive by CNDDB, but not protected under other regulations or policies) would not be offset by the benefits of the SJRRP, then additional compensation will be provided through creating, restoring, or preserving in perpetuity in-kind communities at a sufficient ratio for no net loss of habitat function or acreage. The appropriate ratio will be determined in consultation with USFWS or DFG, depending on agency jurisdiction.	Project and Program	DFG
WUS	**Waters of the United States/waters of the State**		
WUS-1. Identify and quantify wetlands and other waters of the United States	a) Before SJRRP actions that may affect waters of the United States or waters of the State, Reclamation will map the distribution of wetlands (including vernal pools and other seasonal wetlands) in the Eastside and Mariposa bypasses. b) The project proponent will determine, based on the mapped distribution of these wetlands and hydraulic modeling and field observation, the acreage of effects, if any, on waters of the United States. c) If it is determined that vernal pools or other seasonal wetlands will be affected by the SJRRP, the project proponent will conduct a delineation of waters of the United States, and submit the delineation to USACE for verification. The delineation will be conducted according to methods established in the USACE *Wetlands Delineation Manual* (Environmental Laboratory 1987) and *Arid West Supplement* (Environmental Laboratory 2008). d) Construction and modification of road crossings, control structures, fish barriers, fish passages, and other structures will be designed to minimize effects on waters of the United States and waters of the State, and will employ BMPs to avoid indirect effects on water quality.	Project and Program	USACE
WUS-2. Obtain permits and compensate for any loss of wetlands and other waters of the United States/waters of the State	a) The project proponent, in coordination with USACE, will determine the acreage of effects on waters of the United States and waters of the State that will result from implementation of the SJRRP. b) The project proponent will adhere to a "no net loss" basis for the acreage of wetlands and other waters of the United States and waters of the State that will be removed and/or degraded. Wetland habitat will be restored, enhanced, and/or replaced at acreages and locations and by methods agreed on by USACE, ~~and~~ the Central Valley RWQCB, and DFG, as appropriate, depending on agency jurisdiction. c) The project proponent will obtain Section 404 and Section 401 permits and comply with all permit terms. The acreage, location, and methods for compensation will be determined during the Section 401 and Section 404 permitting processes. d) The compensation will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of this Draft PEIS/R).	Project and Program	USACE

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
INV	**Invasive plants**		
INV-1. Implement the Invasive Vegetation Monitoring and Management Plan	a) Reclamation and the project lead agencies will implement the Invasive Vegetation Monitoring and Management Plan for the SJRRP (Appendix L of this Draft PEIS/R), which includes measures to monitor, control, and where possible eradicate, invasive plant infestations during flow releases and construction activities. b) The implementation of the Invasive Vegetation Monitoring and Management Plan (Appendix L of this Draft PEIS/R) will include monitoring procedures, thresholds for management responses, success criteria, and adaptive management measures for controlling invasive plant species. c) The control of invasive weeds and other recommended actions in the Invasive Vegetation Monitoring and Management Plan (Appendix L of this Draft PEIS/R) will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of this Draft PEIS/R).	Project and Program	Lead Agency
CP	**Conservation plans**		
CP-1. Remain consistent with approved conservation plans	a) Facility siting and construction activities will be conducted in a manner consistent with the goals and strategies of adopted habitat conservation plans, natural community conservation plans, or other approved local, regional, or State habitat conservation plans to the extent feasible. Coordination shall occur with USFWS and/or DFG, as appropriate.	Program	USFWS DFG
CP-2. Compensate effects consistent with approved conservation plans	a) The project proponent shall compensate effects consistent with applicable conservation plans and implement all applicable measures required by the plans.	Program	USFWS DFG
GS	**Southern distinct population segment of North American green sturgeon**		
GS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions ~~within~~ affecting green sturgeon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place when the action(s) are performed.	Project and Program	NMFS

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CVS	**Central Valley steelhead**		
CVS-1. Avoid loss of habitat and risk of take of species	a) Impacts to habitat conditions (i.e., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat, etc.) must be analyzed in consultation with NMFS. b) The Hills Ferry Barrier will be operated and maintained to exclude Central Valley steelhead from the Restoration Area during construction activities and until suitable habitat conditions are restored. c) Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. d) Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. e) Disturbance of riparian vegetation will be avoided to the greatest extent practicable. f) A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall be implemented in case of a spill. g) Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. h) A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction, to monitor implementation of conservation measures and water quality. i) The San Joaquin River channel shall be designed to decrease or eliminate predator holding habitat, in coordination with NMFS.	Project and Program	NMFS

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
CVS-2. Minimize loss of habitat and risk of take of species	a) In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. b) In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. c) Construction BMPs for off-channel staging, and storage of equipment and vehicles, will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. d) Riparian vegetation removed or damaged will be replaced at a ratio, coordinated with NMFS, within the immediate area of the disturbance to maintain habitat quality. e) If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction, and following completion, to evaluate species presence and condition and/or habitat conditions. f) If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	Program	NMFS
WRCS	**Sacramento Valley winter-run Chinook salmon**		
WRCS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions related to the SJRRP in the vicinity of winter-run Chinook salmon habitat shall be performed in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed.	Project and Program	NMFS DFG
SRCS	**Central Valley spring-run Chinook salmon**		
SRCS-1. Avoid and minimize loss of habitat and individuals	a) The SJRRP will be operated in such a way that actions in the vicinity of spring-run Chinook salmon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed. b) SJRRP actions shall be performed in accordance with the Experimental Population 4(d) rule, as it is developed, and where applicable.	Project and Program	NMFS DFG

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EFH	**Essential fish habitat (Pacific salmonids and starry flounder)**		
EFH-1. Avoid loss of habitat and risk of take of species	a) Impacts to habitat conditions (e.g., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat) must be analyzed in consultation with NMFS. b) The Hills Ferry Barrier will be operated and maintained to exclude Pacific salmonids from the Restoration Area during construction activities, and until suitable habitat conditions are restored. Under historical operations, the Hills Ferry Barrier is operated September through mid-December. The period of operation under this measure may vary from historical operations. c) Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. d) Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. e) Disturbance of riparian vegetation will be avoided to the greatest extent practicable. f) A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall be implemented in case of a spill. g) Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. h) A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction to monitor implementation of conservation measures and water quality. i) The bottom topography of the San Joaquin River channel will be designed to decrease or eliminate predator holding habitat. j) The SJRRP will be operated in such a way that actions in the vicinity of starry flounder habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed.	Project and Program	NMFS

Table 2-7.
Conservation Measures for Biological Resources That May Be Affected by Settlement Actions (contd.)

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Level of Compliance	Regulatory Agency
EFH-2. Minimize loss of habitat and risk of take from implementation of construction activities	a) In-channel construction activities that could affect habitat for will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. b) In-channel construction activities that could affect habitat for starry flounder and Pacific salmonids will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. c) Construction BMPs for off-channel staging and storage of equipment and vehicles will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. d) Riparian vegetation removed or damaged will be replaced at a ratio, coordinated with NMFS, within the immediate area of the disturbance to maintain habitat quality. e) If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction and following completion to evaluate species presence and condition and/or habitat conditions. f) If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	Program	NMFS

Key:
°C = degrees Celsius
°F = degrees Farenheit
BMP = best management practice
BO = Biological Opinion
CFR = Code of Federal Regulations
cfs = cubic feet per second
CNDDB = California Natural Diversity Database
CVP = Central Valley Project
DFG = California Department of Fish and Game
DWR = California Department of Water Resources
EPA = Federal Environmental Protection Agency
NMFS = National Marine Fisheries Service
PEIS/R = Program Environmental Impacts Statement/Report
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
RWQCB = Regional Water Quality Control Board
Settlement = Stipulation of Settlement in *NRDC, et al,. v. Kirk Rodgers, et al.*
SJRRP = San Joaquin River Restoration Program
State = State of California
SWP = State Water Project
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service

Page 2-80, lines 23-25:

~~Before modifications are completed to convey at least 4,500 cfs in Reach 4B1, Interim and Restoration flows of up to 475 cfs would be routed through Reach 4B1, with remaining Interim and Restoration flows routed through the Eastside Bypass.~~ After

Page 2-86, line 33:

infrastructure to convey recaptured flows to the DMC or California Aqueduct. Recapture of Interim or Restoration flows at new infrastructure or existing facilities would occur only if doing so would not adversely affect downstream water quality or fisheries, consistent with the requirements of Paragraph 16(a)(1) of the Settlement. To the

Page 2-91, line 3:

through the Chowchilla Bypass ~~instead of through the San Joaquin River~~ on a

Page 2-92, Table 2-8:

Table 2-8.
Site-Specific NEPA/CEQA Environmental Compliance Documentation for SJRRP Actions Completed or In Progress

Action	Description	NEPA/CEQA Environmental Compliance Document(s)	Lead Agency or Agencies
Install water level recorders	Install up to seven water level recorders in the San Joaquin River in Fresno and Madera counties to provide data related to hydrograph translation characteristics.	San Joaquin River Restoration Program Water Level Recorder Installation and Data Collection NOE. February 2009.	DWR (CEQA)
Install scour chains	Install scour chains in the San Joaquin River at locations in Fresno and Madera counties to provide data on sediment transport.	San Joaquin River Restoration Program Scour Chain Installation and Data Collection NOE. February 2009.	DWR (CEQA)
Install and rehabilitate stream gages	Rehabilitate and retrofit the existing stream gage stations at the Chowchilla Bypass Bifurcation Structure and below Sack Dam on the San Joaquin River, and install two new monitoring stations at the top of Reach 4B and one at the confluence of the Merced and San Joaquin rivers.	Installation and Rehabilitation of Stream Gages on the San Joaquin River, Fresno, Madera, and Merced Counties, California EA/FONSI. December 2008. Stream Gage Installation and Operation and Maintenance Project IS/MND. March 2009.	Reclamation (NEPA) and DWR (CEQA)
Sample stream bed sediment	Sample bed material at 20 locations to establish baseline data before release of Water Year 2010 Interim Flows.	San Joaquin River Restoration Program Stream Bed and Sand Sampling NOE. April 2009.	DWR (CEQA)

**Table 2-8.
Site-Specific NEPA/CEQA Environmental Compliance
Documentation for SJRRP Actions Completed or In Progress (contd.)**

Action	Description	NEPA/CEQA Environmental Compliance Document(s)	Lead Agency or Agencies
Seal the gates of the Chowchilla Bypass Bifurcation Structure	Install seals on the gates of the Chowchilla Bypass Bifurcation Structure to reduce or prevent flow from entering the sediment catchment basin downstream from the gates.	Chowchilla Bifurcation Structure Gate Seal Installation NOE. August 2009.	DWR (CEQA)
Release of Water Year 2010 Interim Flows	Implement provisions of the Settlement related to Water Year 2010 Interim Flows and to collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2010 Interim Flows Project EA/FONSI and IS/MND. September 2009.	Reclamation (NEPA) and DWR (CEQA)
Recirculation of recaptured Water Year 2010 Interim Flows	Implement provisions of the Settlement pertaining to the Water Management Goal for Water Year 2010 Interim Flows and to collect relevant data to guide future recirculation of Interim and Restoration flows.	Recirculation of Recaptured Water Year 2010 San Joaquin River Restoration Program Interim Flows EA/FONSI. February 2011.	Reclamation (NEPA)
Gather geotechnical data and install monitoring wells	Install groundwater monitoring wells adjacent to the San Joaquin River and collect geotechnical data through exploration holes at existing and potential new levees, control structures, river crossing structures, and test pits to identify possible borrow material.	Draft San Joaquin River Restoration Program Geotechnical Investigation and Seepage Well Installation Project IS/MND. October 2009.	DWR (CEQA)
Release Water Year 2011 Interim Flows	Implement provisions of the Settlement related to Water Year 2011 Interim Flows and collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2011 Interim Flows Project Supplemental EA/FONSI. September 2010.	Reclamation (NEPA)
Recirculation of recaptured Water Year 2011 Interim Flows	Implement provisions of the Settlement pertaining to the Water Management Goal for Water Year 2011 Interim Flows and to collect relevant data to guide future recirculation of Interim and Restoration flows.	Recirculation of Recaptured Water Year 2011 San Joaquin River Restoration Program Interim Flows EA/FONSI. June 2011.	Reclamation (NEPA)

**Table 2-8.
Site-Specific NEPA/CEQA Environmental Compliance
Documentation for SJRRP Actions Completed or In Progress (contd.)**

Action	Description	NEPA/CEQA Environmental Compliance Document(s)	Lead Agency or Agencies
Release Water Year 2012 Interim Flows	Implement provisions of the Settlement related to Water Year 2012 Interim Flows and collect relevant data to guide future releases of Interim and Restoration flows.	Water Year 2012 Interim Flows Project Supplemental EA/FONSI. September 2011.	Reclamation (NEPA)

Key:
CEQA = California Environmental Quality Act
DWR = California Department of Water Resources
EA/FONSI = Environmental Assessment/Finding of No Significant Impact
IS/MND = Initial Study/Mitigated Negative Declaration
NEPA = National Environmental Policy Act
NOE = Notice of Exemption
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
SJRRP = San Joaquin River Restoration Program

Page 2-94, lines 13-14:

Restoration Area, and estimating water supply demands at the Mendota Pool, the Lone Tree Unit, and/or the East Bear Creek Unit, if those points are to be used for recapturing Interim or Restoration

Page 2-95, lines 13-14:

The SJRRP is being implemented concurrently with other programs by ~~that~~ other agencies that would~~are considering to~~ modify the San Joaquin River and the Lower San Joaquin River Flood

Page 2-95, line 17:

Area through the Non-Urban Levee Evaluation Program as part of the California FloodSAFE initiative. Initial findings from these evaluations indicate deficiencies in flood

Page 2-95, line 30:

Restoration Area through the Non-Urban Levee Evaluation Program~~ject~~ as part of the

4.2 Chapter 3.0, "Considerations for Describing the Affected Environment and Environmental Consequences"

Page 3-2, lines 24-25:

past Gravelly Ford, providing deliveries to ~~riparian water rights holders in Reach 1 under~~ "holding contracts~~.~~" in Reach 1. The reach is divided into two subreaches, 1A and 1B. Reach

Page 3-2, lines 28-29:

has been extensively mined for instream gravel. Reach 1A ~~and~~ is limited for sediment supply.

Page 3-4, lines 19-20:

accounts for approximately 42 percent of the States annual runoff (Water Education Foundation 1992, as cited in Reclamation 1997). Tributaries that directly discharge into the Delta include the

Page 3-5, lines 10-21:

Reclamation holds ~~most~~many of the water rights on the San Joaquin River, ~~allowing diversion of water at Friant Dam through purchase and~~and through exchange agreements with entities holding ~~those~~other rights on the San Joaquin River (the most significant of these exchange agreements is the San Joaquin River Exchange Contract), diverts water at Friant Dam. ~~when the project was developed.~~ With the exception of flood control operations, water released from Friant Dam to the San Joaquin River is limited to that necessary to ~~satisfy riparian water rights and~~ meet the requirements of the holding contracts along the San Joaquin River between Friant Dam and Gravelly Ford. Under the terms and conditions of the San Joaquin River Exchange Contract, Reclamation is obligated to deliver to the San Joaquin River Exchange Contractors water from the DMC or other sources. If Reclamation is temporarily unable to do so, water is to be diverted from the San Joaquin River in accordance with Article 4.4. of the San Joaquin River Exchange Contract. If Reclamation is permanently unable to deliver water from the DMC or other sources, the San Joaquin River Exchange Contractors shall receive water from the San Joaquin River in accordance with Article 4.c. of the San Joaquin River Exchange Contract. Similar requirements are found in San Joaquin River water right adjustment and settlement contracts executed between Reclamation and various water users. ~~The highest priority agreement involving the largest amount of water requires annual delivery of approximately 840 TAF of water to the Mendota Pool to water right holders along the San Joaquin River. This obligation is typically met with water exported from the Delta via the DMC in accordance with San Joaquin River Exchange Contracts. If Delta water were not available to meet these commitments, Reclamation would have to release water from Friant Dam to meet these commitments.~~

4.3 Chapter 5.0, "Biological Resources – Fisheries"

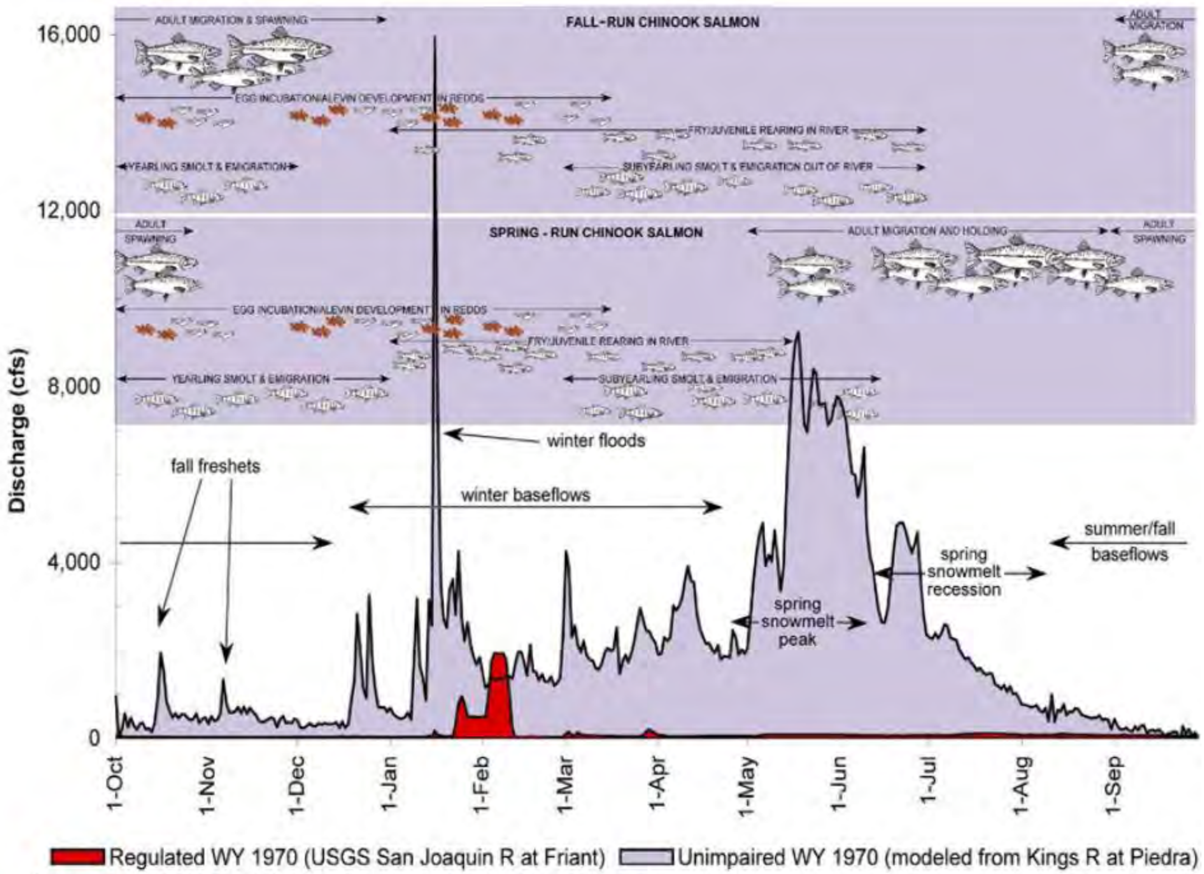
Page 5-1, line 23:

- ~~USFWS Endangered Species Lists, April 2008~~

Page 5-2, lines 8-10:

was sand-bedded, meandering, and, in some reaches, had multiple channels. Reaches 3 through 5 were also noted for flood basins adjacent to the river that had extensive tule marsh habitat and sloughs. Riparian vegetation varied between the reaches, with patchy riparian

Page 5-4, Figure 5-1 is replaced with the following figure:



Source: McBain and Trush 2002.

Key: cfs = cubic feet per second
R = river
USGS = U.S. Geological Survey
WY = water year

Note: Timing for the various life history stages shown for spring- and fall-run Chinook salmon are approximate and may vary.

Figure 5-1.
Annual Unimpaired Hydrograph of San Joaquin River at Friant (modeled) and Regulated Flows at Friant (measured) for Approximately Average Water Year Conditions

Page 5-5, lines 2-4:

After completion of Friant Dam and additional hydropower facilities upstream, and resulting downstream changes in flow and sediment dynamics, the frequency and distribution of habitat types and microhabitat features of the San Joaquin River changed substantially compared to historical conditions.

Page 5-9, lines 11-12:

Fall-run Chinook salmon generally spawned lower in the watershed than spring-run Chinook salmon (~~DFG 1957~~ Yoshiyam et al. 1998).

Page 5-12, lines 19-30:

Hybridization

Hybridization can occur through mating when there is ~~a shift in~~ temporal (timing) or spatial (area) habitat use between two closely related species or even subspecies and evolutionarily significant units (as in the case for Chinook salmon in the Central Valley). This phenomenon can lead to loss of unique genetic composition, reduced genetic fitness, and reduced reproductive success (Allendorf et al. 2001). Hybridization can pose a potentially serious conservation problem through loss of distinct, native, or potentially adaptive genetic components or lineages (Stephens and May 2007).

The ~~H~~hybridization can ~~occur~~ increase through water diversions that entrain and transfer fish (along with water) from one drainage to another (Moyle 2002a). Habitat modifications can also serve as important factors contributing to increases in hybridization rates (Rhymer and Simberloff 1996).

Page 5-13, lines 38-40:

Dam. ~~In this section of the river, the San Joaquin~~ River ~~flows at 15 cfs in dry water years and 25 cfs in normal water years, as mandated~~ are regulated ~~by the Federal Energy Regulatory Commission (FERC), with additional unregulated releases during high flows (PG&E 1999).~~ Several reservoirs in the upper portion of the San Joaquin River watershed, including Mammoth Pool and Shaver Lake, are used primarily for hydroelectric power generation (see Chapter 19.0, “Power and Energy”). Operation of these reservoirs affects timing of inflow to Millerton Lake. Big Sandy Creek, Fine Gold Creek, and several smaller, ephemeral streams also provide flows directly into Millerton Lake. The river

Page 5-16, lines 9-13:

Potential false pathways created by the bypass and canal systems are Salt Slough, Mud Slough, Bear Creek, Ash Slough, Berenda Slough, Dry Creek, Fresno River, Lone Willow Slough, James Bypass, Mariposa Bypass, Eastside Bypass, Arroyo Canal, Main Canal, other canals, and Little Dry Creek (see Chapter 2.0, “Description of Alternatives” for a map of the Restoration Area, including many of these pathways).

Page 5-17, lines 29-32:

Friant Dam has eliminated sediment supply from the upper watershed to the San Joaquin River downstream from the dam. Small particles on the bed surface, such as spawning-sized gravels less than 32 millimeters (mm), have likely been mobilized and deposited downstream since dam construction.

Page 5-18, lines 7-8:

Ford and Friant Dam (38 miles of channel) (Fry and Hughes 1958, as cited in ~~Cain 1997~~McBain and Trush 2002). In 1957, Ehlers (R. Ehlers, pers. com. with J. Cain, as cited in McBain and Trush 2002~~Cain 1997~~) estimated that

Page 5-18, Table 5-1:

Table 5-1.
Summary of Anadromous Salmonid Spawning Habitat Estimates in Reach 1 of Restoration Area

Source	Survey Year	Extent of Survey	Estimated Total (square feet)	Estimated Suitable (square feet)
Clark (1942)	1942	Highway 41 to Kerckhoff Powerhouse	417,000	266,800[1]
Fry and Hughes (1958)	1943	Gravelly Ford to Friant Dam	1,000,000[2]	None
Ehlers, pers. com. (McBain and Trush 2002~~Cain 1997~~)	1957	Gravelly Ford to Friant Dam	2,600,000	1,820,000[3]
Cain (in McBain and Trush 2002~~1997~~)	1996	Gravelly Ford to Friant Dam	303,000	none
Jones and Stokes Assoc./Entrix (in McBain and Trush 2002)	2001	Friant Dam to Skaggs Bridge	773,000[4]	408,000[4 5]
Stillwater Sciences (in McBain and Trush 2002)	2002	Friant Dam to Highway 99 Bridge	357,000[6]	281,400[1 6]

Notes:
[1] Spawning habitat between Highway 41 and Friant Dam
[2] Estimated at 350 cfs; therefore, incorporated hydraulic suitability
[3] Seventy percent of 2,600,000 square feet was suitable; presumed criterion was quality (limit of fine sediment in gravel)
[4] Included gravel beyond the baseflow channel (e.g., on point bars); probable over-estimate
[5] Based on portion of spawning gravel with less than 40 percent fines (ocular estimate)
[6] Incorporated hydraulic suitability at potential spawning baseflows
Key:
cfs = cubic feet per second
pers. com. = personal communication

Page 5-18, lines 18-20:

More recently, Cain (1997, as cited in McBain and Trush 2002) estimated a total of 303,000 square feet of spawning gravel 18 between Gravelly Ford and Friant Dam (Table 5-1). Most riffles in Reach 1 were 19 described as having suitable gravels, and Cain (1997, as cited in McBain and Trush 2002) attributed the decline of spawning

Page 5-23, lines 23-34:

Reach 1. Studies conducted from 2003 through 2005 by DFG and Reclamation, inventoried recent fish distributions in the Restoration Area (DFG 2007). In the DFG/Reclamation surveys, the ~~N~~native fish species captured in Reach 1A included rainbow trout, Sacramento sucker, threespine stickleback, lamprey species, sculpin species, and Sacramento pikeminnow (DFG 2007). No native fish species were captured in Reach 1B during the DFG/Reclamation inventory. Although these species were not detected in Reach 1 from 2003 through 2005, earlier investigations report occurrence in Reach 1 of riffle sculpin (Brown and Moyle 1993), prickly sculpin (Saiki 1984, Brown and Moyle 1993, Moyle 2002a), hardhead (Saiki 1984, Moyle et al. 1989, Brown and Moyle 1993, Mayden et al. 1991, as cited in Moyle 2002a), tule perch (Saiki 1984, Brown and Moyle 1993, Moyle 2002a), and fall-run Chinook salmon (Yoshiyama et al. 1998, DFG 1991, as cited in McBain and Trush 2002, Moyle 2002a). Striped bass have also been observed in Reach 1 (Guzman pers. com). The Fisheries Management Work Group is currently conducting a fish inventory and monitoring program, the results of which have not yet been published.

Page 5-24, lines 7-10:

shifts from native species to nonnative species (DFG 2007). Much of Reach 2 is typically dry; thus, fish populations are confined to the upper part of Reach 2 ~~upstream from Gravelly Ford~~, and to Mendota Pool in the lower part of Reach 2, with restricted fish migration between these habitats.

Page 5-24, lines 31-33:

The current distributions of white sturgeon, green sturgeon, river lamprey (*Lampetra ayresii*), Kern brook lamprey, and western brook lamprey (*L. richardsoni*) within the Restoration Area are unknown. The Fisheries Management Work Group is currently conducting a fish inventory and monitoring program, the results of which have not yet been published.

Page 5-24, lines 38-40:

temporary aquatic habitat in the bypasses is not available. However, it is assumed that any species present near the diversion points could be routed or entrained into the bypasses along with flood flows.

Page 5-25, lines 31-35:

Hardhead are also listed as a California State species of special concern primarily because of their reduced numbers and increasingly isolated populations throughout California streams. Historical records indicate that they were once present in most streams in the San Joaquin drainage ~~(Reeves 1964)~~, but today a number of the populations has~~ve~~ disappeared (Brown and Moyle 1993).

Page 5-25, line 41:

Documentation of fertilized white sturgeon eggs in the San Joaquin River downstream from Reach 5, primarily between the Tuolumne and Stanislaus rivers, have been made during monitoring by the Anadromous Fish Restoration Program (Gruber et al. 2012). Each of these native species ~~is also~~ may periodically be present in the Restoration Area.

Page 5-26, line 40 to page 5-27, line 6:

Aquatic Habitat

The Merced River is accessible to anadromous fish for the first 51 river miles upstream from the San Joaquin River confluence, with access terminating at Crocker-Huffman Dam (USFWS 2001). Most anadromous fish spawning occurs within a few miles of the dam. Aquatic habitats in the Tuolumne River downstream from LaGrange Dam are influenced by several factors, many of them related to former gold mining activities and gravel mining (McBain and Trush 2000). In the Stanislaus River, fall-run Chinook salmon spawn in a 23-mile stretch of the Stanislaus downstream from Goodwin Dam, but most spawning occurs in the first 10 miles below the dam. Anadromous fish populations on all three tributaries are affected by flow and water temperatures, particularly during dry and critical water year types (Mesick 2009 and 2010).

Page 5-29, lines 10-14:

Geological Survey (USGS) station 11-303500) and CVP and SWP exports. Until 2008, as ~~As~~ part of VAMP, in years when spring flow in the San Joaquin River ~~is~~ was less than 7,000 cfs, a temporary barrier ~~is~~ was placed at the Head of Old River to prevent outmigrating San Joaquin River basin salmon from migrating directly down the Old River channel toward the pumps.

Page 5-29, line 20:

when DO concentrations improve (Hallock et al. 1970, Mesick 2001, Newcomb and Pierce 2010).

Page 5-31, lines 6-9:

~~Section 401 of the CWA requires Federal agencies to obtain certification from the state or Native American tribes before issuing permits that would result in increased pollutant loads to a water body. The certification is issued only if such increased loads would not cause or contribute to exceedences of water quality standards.~~

Section 401 of the CWA requires entities to obtain certification from the state or Native American tribes when applying for a Federal license or permit which may result in increased pollutant loads to a water body. The certification is issued only if such increased loads would not cause or contribute to exceedences of water quality standards.

Page 5-31, lines 20-23:

~~Section 10 of the Rivers and Harbors Act (RHA) (33 USC 401 et seq.) requires authorization from USACE for construction of any structure over, in, or under navigable waters of the United States.~~

Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. Code (USC) 401 et seq.) requires project proponents to obtain authorization from USACE before constructing any structure over, in, or under navigable waters of the United States. Under Section 14 of the Rivers and Harbors Act (33 USC 408)—most often referred to as Section 408—the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for a project to temporarily occupy or use a seawall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States. In administering Sections 10 and 408, USACE must consider the environmental effects of actions regulated under these statutes, especially with respect to aquatic resources and fisheries.

Page 5-33, between lines 29 and 30:

Porter-Cologne Water Quality Control Act The Porter-Cologne Act is California's statutory authority for the protection of water quality. Under the act, the State must adopt water quality policies, plans, and objectives protecting the waters of the State for the use and enjoyment of the people. "Waters of the State" means any surface water or groundwater, including saline waters, within the boundaries of the State (California Water Code Section 13050(e)). The act sets forth the obligations of SWRCB and RWQCBs to adopt and periodically update their basin plans. A basin plan identifies the designated beneficial uses for specific surface water and groundwater resources, applicable water quality objectives necessary to support the beneficial uses, and implementation programs that are established by the RWQCBs to maintain and protect water quality from degradation. The Porter-Cologne Act also requires waste dischargers to notify RWQCBs of their activities by filing reports of waste discharge. In addition, the act authorizes SWRCB and RWQCBs to issue and enforce waste discharge requirements, National Pollutant Discharge Elimination System permits, Section 401 water quality certifications, or other approvals. RWQCBs also have the authority to issue waivers to reports of waste discharge/waste discharge requirements for broad categories of "low threat" discharge activities that have minimal potential for adverse effects on water quality, when implemented according to prescribed terms and conditions.

Page 5-33, lines 31-37:

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the California Fish and Game Code, a permit from DFG is required for projects that could result in the take of a species that is State-listed as threatened or endangered. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harm" or "harass," as the Federal ESA does. As a result, the threshold for take is higher under CESA than under the Federal ESA. Species of plants and animals need not be officially listed as Endangered, Rare, or Threatened on any State or Federal list to be considered Endangered, Rare, or Threatened under CEQA. Section 15380 of the State CEQA Guidelines sets forth distinct definitions for Endangered, Rare, or Threatened species which encompass and expand on these designations under CESA.

Page 5-34, lines 4-7:

- **Section 1602~~—Streambed Alteration~~ –** Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code.

- **Section 5650 –** It is unlawful to deposit in, permit to pass into, or place where it can pass into a "Waters of the State" any substance or material deleterious to fish, plant life, or bird life

- **Section 5652 –** Prohibits the deposition of any cans, bottles, garbage, motor vehicle or parts thereof, or rubbish within 150 feet of the high water mark of the "Waters of the State" (or where they can pass into any "Waters of the State")

- **Section 5937 –** The owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam. During the minimum flow of water in any river or stream, permission may be granted by the department to the owner of any dam to allow sufficient water to pass through a culvert, waste gate, or over or around the dam, to keep in good condition any fish that may be planted or exist below the dam, when, in the judgment of the department, it is impracticable or detrimental to the owner to pass the water through the fishway.

- **Sections 2080.2, 2080.3 and 2080.4 –**Senate Bill 1349, approved and filed in 2010, provides that a person who obtains a Federal enhancement of survival permit that authorizes the take of spring run Chinook salmon, in order to establish or maintain an experimental population in the San Joaquin River pursuant to the ESA and the Act, requires no further authorization or approval under CESA for that person to take that species as identified in, and in accordance with, the enhancement of survival permit, if specified requirements are met.

Page 5-37 through 5-42, Table 5-3:

Table 5-3.
Summary of Environmental Consequences – Fisheries

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Program-Level				
FSH-1: Changes in Water Temperatures in the San Joaquin River Between Friant Dam and the Merced River	No-Action	PS	--	PS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-2: Changes in Pollutant Discharge in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~ LTS and Beneficial	--	~~PS~~ LTS and Beneficial
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-3: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~ LTS	--	~~PS~~ LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-4: Construction-Related Changes in Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Program-Level (~~continued~~contd.)				
FSH-5: Displacement from Preferred or Required Habitat, Injury, or Mortality in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-6: Changes in Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-7: Changes in Diversions and Entrainment in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-8: Changes in Predation Levels in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Program-Level (~~continued~~contd.)				
FSH-9: Changes in Food Web Support in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-10: Effects to Fall-Run Chinook Salmon from Hybridization Resulting from Reintroduction of Spring-Run Chinook Salmon to the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-11: Effects of Disease on Fisheries in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-12: Changes in Diversions and Entrainment in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-13: Changes in Water Temperatures in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Program-Level (~~continued~~contd.)				
FSH-14: Displacement from Preferred or Required Habitat, Injury, or Mortality in the San Joaquin River Between Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS
Biological Resources – Fisheries: Project-Level				
FSH-15: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Upstream from Friant Dam	No-Action	PS	--	PS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-16: Changes in Pollutant Discharge and Mobilization in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
FSH-17: Changes in Sediment Discharge and Turbidity in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-18: Changes in Fish Habitat Conditions in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

**Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Project-Level (~~continued~~contd.)				
FSH-19: Changes in Diversions and Entrainment in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-20: Changes in Predation Levels in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-21: Changes in Food Web Support in the San Joaquin River Upstream from Friant Dam	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-22: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Between Friant Dam and the Merced River	No-Action	PS	--	PS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

**Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Project-Level (~~continued~~contd.)				
FSH-23: Changes in Pollutant Discharge and Mobilization in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS	--	~~PS~~LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-24: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River	No-Action	~~PS~~LTS	--	~~PS~~LTS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-25: Changes in Fish Habitat Conditions in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-26: Changes in Diversions and Entrainment in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-27: Changes in Predation Levels in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

**Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Project-Level (~~continued~~contd.)				
FSH-28: Changes in Food Web Support in the San Joaquin River Between Friant Dam and the Merced River	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-29: Effects of Disease on Fisheries in the San Joaquin River Between the Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-30: Changes in Chinook Salmon and Steelhead Habitat in the Merced, Tuolumne, and Stanislaus Rivers	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-31: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the Delta	No-Action	PS	--	PS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-32: Changes in Pollutant Discharge and Mobilization in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Project-Level (~~continued~~contd.)				
FSH-33: Changes in Sediment Discharge and Turbidity in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-34: Changes in Fish Habitat Conditions in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
FSH-35: Changes in Diversions and Entrainment in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-36: Changes in Predation Levels in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table 5-3.
Summary of Environmental Consequences – Fisheries (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Biological Resources – Fisheries: Project-Level (~~continued~~contd.)				
FSH-37: Changes in Food Web Support in the Delta	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-38: Salinity Changes in the Delta	No-Action	PS	--	PS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
FSH-39: Changes to Delta Inflow and Flow Patterns in the Delta	No-Action	PS	--	PS
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Key:
-- = not applicable
Delta = Sacramento-San Joaquin Delta
LTS = less than significant
PS = potentially significant

Page 5-43, lines 13-15:

greater detail, as necessary, in project-specific environmental compliance documents. The Fisheries Management Work Group is currently working with NMFS and DFG to identify how, where, and when the donor stocks should be collected, so that there is no adverse effect to those donor stocks. It is currently unknown what criteria and population thresholds NMFS and DFG may apply to determine what constitute acceptable parameters of a stock population collection program. However, the selection of source populations will be balanced between ensuring the success of the individuals ultimately reintroduced to the Restoration Area, and minimizing adverse effects to declining source populations. In addition to identifying the specific source population(s) to be used, additional decisions yet to be finalized include the number and life stage of individuals to be collected as well as the frequency, timing, and method of collection of individuals. Without additional information regarding the likely source population(s) and collection approach, insufficient data are available on which to conduct a program-level analysis of potential impacts in this Draft PEIS/R. The source population(s) to which the impacts could occur, and the potential severity of the impacts, cannot be determined without substantial additional information; such an analysis for this Draft PEIS/R would be too speculative for meaningful consideration. Information currently available for project-level actions is sufficient to support a more detailed, project-level impacts assessment.

Page 5-45, Table 5-4:

Table 5-4.
Fish Species Considered in PEIS/R Impacts Assessment, by Geographic Area

	River Lamprey	Kern Brook Lamprey	Hardhead	Sacramento Splittail	Fall-/Late Fall-Run Chinook Salmon	Winter-Run Chinook Salmon	Spring-Run Chinook Salmon	Central Valley Steelhead	Sturgeon[1]	Delta Smelt	Longfin Smelt	Black Bass[2]	Striped Bass	Rainbow Trout
Millerton Lake and San Joaquin River upstream from Millerton		X	X									X	X	X
San Joaquin River from Friant Dam to Merced River		X	X	X					X			X	X	X
San Joaquin River from Merced River to Delta	X		X	X	X			X	X			X	X	X
Delta	X			X	X	X	X	X	X	X	X	X	X	

Notes:
[1] Includes North American green sturgeon (southern distinct population) and white sturgeon
[2] Includes largemouth bass, smallmouth bass, and spotted bass

Key:
Delta = Sacramento-San Joaquin Delta
PEIS/R = Program Environmental Impact Statement/Report

Page 5-50, Table 5-7:

Table 5-7.
Environmental Conditions for Each Representative Fish Species in San Joaquin River from Merced River to Delta

Environmental Conditions	River Lamprey				Hard-head		Sacramento Splittail				Fall-Run Chinook Salmon				Central Valley Steelhead				Black Bass[1]		Striped Bass			
	Adult Spawning Migration	Spawning/Incubation	Juvenile Rearing	Adult Downstream Migration	Spawning/Incubation	Juvenile/Adult Rearing	Adult Migration	Spawning/Incubation	Juvenile Rearing	Juvenile Migration	Adult Migration	Spawning/Incubation	Juvenile Rearing	Juvenile Migration	Adult Migration	Spawning/Incubation	Juvenile Rearing	Juvenile Migration	Spawning/Incubation	Juvenile/Adult Rearing	Adult Migration/ Foraging	Spawning/Incubation	Larval/Juvenile Rearing	Juvenile Migration
Water Temperature							○	●	○	○	<u>●</u>	<u>●</u>	~~○~~ <u>●</u>	○	<u>●</u>	<u>●</u>	~~○~~ <u>●</u>	<u>○</u> <u>●</u>						
Pollutants	○	○	○	○	○	○	○	○	○	○	○		○	○	○		○	○				○	○	○
Turbidity					○	○			○				<u>●</u>	<u>●</u> ~~○~~	<u>○</u>		○	○						
Geomorphic Processes					○																			
Aquatic, Riparian and Floodplain Habitat					○	○	○	●	○	○			~~○~~ <u>●</u>				~~○~~ <u>●</u>		○	○	○	○	○	
Aquatic Habitat Connectivity	○			○			●			●	●				<u>●</u>						●			●
Diversions						○	●	○	○	●				●	<u>○</u>			●						
River Flow											<u>●</u>		~~○~~ <u>●</u>	○	<u>○</u>		~~○~~ <u>●</u>	~~○~~ <u>●</u>						
Delta Flow											<u>○</u>				<u>○</u>									
Reservoir Surface Level																								
Predation						○			○	○													○	
Food Resources and Food Web Support			○			○			○	○					<u>●</u>		<u>○</u>			○			○	
Hybridization												○				○								
Competition												○	<u>○</u>	<u>○</u>			<u>○</u>	<u>○</u>						
Disease											<u>●</u>	○	<u>○</u>	<u>○</u>	<u>●</u>	○	<u>○</u>	<u>○</u>						

Notes:
● Impact mechanism is well understood, applicable to species' distribution in the assessment area, and information is available for assessment.
○ Applicable to species' distribution in the assessment area, but impact mechanism is uncertain and/or information available for assessment is incomplete.
[1] Includes largemouth bass, smallmouth bass, and spotted bass.
Key: Delta = Sacramento-San Joaquin Delta

Page 5-51, lines 12-14:

and in the south Delta. ~~Characterization of species response was predicated on assumptions about environmental conditions that may or may not persist in light of accelerated climate change.~~ Climate change impacts on San Joaquin River water

Page 5-51, line 17

Restoration Area using downscaled data and ~~Global~~General Circulation Model (GCM) ensemble

Page 5-51, lines 22-24:

Water Temperature and Water Quality. Water temperature and water quality ~~plan~~ play a key role in the survival, reproductive success, and growth of fishes in the San Joaquin River.

Page 5-55, line 9:

Existing fish passage barriers and impediments are listed in Table 5-9 as well as in Appendix B of the 2011 ATR.

Page 5-58, lines 17-19:

some percentage in the Mendota Pool. ~~From the Mendota Pool, p~~Predatory fish originating from the lower San Joaquin River near the Delta ~~downstream from the Merced River confluence~~ and from the Delta could become entrained at pumping plants in the Delta, and potentially enter the ~~San Joaquin River in the~~ Restoration Area at the Mendota Pool via the DMC.

Page 5-60 lines 11-20:

- Vernalis Adaptive Management Program – VAMP ~~is~~ was an experimental and management program designed to protect San Joaquin River juvenile Chinook salmon as they migrate to and through the Delta, but ended in 2011. VAMP ~~is~~ was also set up to determine how survival rates change in response to alterations in San Joaquin River flows and CVP/SWP exports with the installation of the Head of Old River Barrier. VAMP ~~employs~~ employed an adaptive management strategy to use current knowledge of hydrology and environmental conditions to protect Chinook salmon smolts, while gathering information to allow more efficient protection in the future. VAMP ~~specifies~~ specified a 31-day pulse flow during the 61-day window of April and May to coincide with fish movement in the area. Although VAMP expired in 2011, the No-Action Alternative includes a continuation of a VAMP-like condition. SWRCB indicates that VAMP experimental data will be used to create permanent objectives for the pulse flow period. It is assumed for the purpose of this analysis that new SWRCB objectives will maintain the same level of protection for fisheries as the current program or increase the level of protection, and that such protections will remain in place through 2030. Because considerable uncertainty remains as to the flows that will occur under future flow requirements in the San Joaquin River, the analyses include the continuation of VAMP as a surrogate for these requirements.

Page 5-61, Table 5-11:

Table 5-11.
Tributary Flows Assumed to Provide Maximum Habitat

Time Frame	Life Stage	Flow[1] (cfs)
Merced River Chinook Salmon/Steehead[~~1~~2]		
October 1 – December 31	Spawning	400
January 1 – March 15	Incubation/fry rearing	400
March 16 – June 15	Juvenile Rearing/Migration	1,500
June 15 – October 31	Juvenile rearing/Adult (steelhead)	250
Tuolumne River Chinook Salmon[~~2~~3]		
October 1 – April 30	Spawning/Incubation/Fry Rearing	275
February 1 – October 31	Juvenile Rearing	150
January 1 – June 30	Juvenile Migration	1,100
Tuolumne River Steelhead[23]		
January 1 – December 31	All life stages	275
March 15 – June 30	Juvenile Migration	1,100
Stanislaus River Chinook Salmon[~~3~~4]		
October 15 – December 31	Spawning	300
January 1 – February 28	Incubation/Fry Rearing	300
February 15 – March 15	Juvenile Rearing	200
March 15 – June 30	Juvenile Migration	2,000
Stanislaus River Steelhead[~~3~~4]		
November 1 – Feb 28	Spawning	200
January 1 – March 31	Incubation/Fry Rearing	200
January 1 – December 31	Juvenile Rearing	150
March 15 – June 30	Juvenile Migration	2,000

Sources: USFWS 1993, ~~and 1995~~, ~~Erin Strange pers. Com. 2011~~ and 1997, DFG 2005, and NMFS 2009

Notes:

[1] Flows are identified for the purposes of analyses presented in this Draft PEIS/R, and do not reflect a legal or regulatory requirement or regulation on flows.

[~~1~~2] Because information is limited on steelhead, flows needed for Chinook salmon and steelhead are combined. Flows are based on information from the 1997 spawning habitat instream flow assessment and flow recommendations from the Anadromous Fish Restoration Program.

[~~2~~3] Flows are based on the ~~Stanislaus~~ Tuolumne River Instream Flow Incremental Methodology report, and from results of the California Department of Fish and Game San Joaquin River Fall-Run Chinook Salmon Population model.

[~~3~~4] Flows are based on the Stanislaus River Instream Flow Incremental Methodology report, and from the 2009 Operations Criteria and Plan Biological Opinion– below-normal year

Key:

cfs = cubic feet per second

Page 5-63, lines 23-27

duration overlap (see Appendix K, "Biological Resources – Fisheries"). Furthermore, recent research indicates ~~that redd superimposition is currently unlikely to limit adult Chinook salmon recruitment in these San Joaquin River tributaries because~~ many more fry are produced at high densities of spawners than can be sustained by the available rearing habitat (Mesick and Marston 2007), so redd superimposition is currently unlikely to limit adult Chinook salmon recruitment in the San Joaquin River tributaries.

Page 5-64 through 5-65, Table 5-12:

Table 5-12.
Environmental Conditions Included in Impact Assessment for Each Representative Species, by Life Stage, in Sacramento-San Joaquin Delta

Environmental Conditions	Sacramento Splittail				Chinook salmon				Central Valley Steelhead				Sturgeon[1]				Delta Smelt			Longfin Smelt			Striped Bass			
	Adult Migration	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Larval/Juvenile Rearing**	**Juvenile Migration**	**Spawning/Incubation**	**Larval Rearing**	**Juvenile/Adult Rearing**	**Spawning/Incubation**	**Larval Rearing**	**Juvenile/Adult Rearing**	**Adult migration/Foraging**	**Spawning/Incubation**	**Larval/Juvenile Rearing**	**Juvenile Migration**
Water Temperature	○	○	○	○	●		●	●	●		○	○	○		○	○	○	○	○	○	○	○	○	○	○	○
Pollutants	○	○	○	○	○		○	○	○		○	○			○	○	○	○	○	○	○	○	○	○	○	○
Turbidity			○				○	○			○	○			○		○	○	○	○	○	○	○		○	○
Geomorphic Processes																										
Aquatic, Riparian, and Floodplain Habitat	○	○	○	○			○	○			○	○			○	○	○	○	○	○	○	○	○	○	○	○
Aquatic Habitat Connectivity																										
Diversions	●	○	○	●			●	●			●	●			○	○	●	●	●	●	●	●			●	●
River Flow																										
Delta Flow	○	○	○	○	●		●	●	●		●	●	○		○	○	●	●	●	●	●	●	○	●	●	●
Reservoir Surface Level																										
Predation		○	○	○			●	●			○	○			○	○	○	○	○	○	○	○			○	○

Table 5-12.
Environmental Conditions Included in Impact Assessment for Each Representative Species, by Life Stage, in Sacramento-San Joaquin Delta (contd.)

Environmental Conditions	Sacramento Splittail				Chinook salmon				Central Valley Steelhead				Sturgeon[1]				Delta Smelt			Longfin Smelt			Striped Bass			
	Adult Migration	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Juvenile Rearing**	**Juvenile Migration**	**Adult Migration**	**Spawning/Incubation**	**Larval/Juvenile Rearing**	**Juvenile Migration**	**Spawning/Incubation**	**Larval Rearing**	**Juvenile/Adult Rearing**	**Spawning/Incubation**	**Larval Rearing**	**Juvenile/Adult Rearing**	**Adult migration/Foraging**	**Spawning/Incubation**	**Larval/Juvenile Rearing**	**Juvenile Migration**
Food Resources and Food Web Support	○	○	○	○			○	○			○	○			○	○	○	○	○	○	○	○	○		○	○
Hybridization																										
Competition																										
Disease																										

Notes:

● Impact mechanism is well understood, applicable to species' distribution in the assessment area, and information is available for assessment.

○ Applicable to species' distribution in the assessment area, but impact mechanism is uncertain and/or information available for assessment is incomplete.

[1] Includes North American green sturgeon (Southern DPS) and white sturgeon.

Page 5-66 lines 23-25:

action in terms of its context and the intensity of its impacts. Effects on fish would be considered significant if implementation, operation, or maintenance of program ~~actions included in~~ alternatives would do the following:

Page 5-68 lines 24-43:

Impact FSH-2 (No-Action Alternative): ***Changes in Pollutant Discharge in the San Joaquin River Between Friant Dam and the Merced River – Program-Level.*** ~~Under the No-Action Alternative, potential increased discharges and nonpoint source runoff of agricultural pollutants because of the planned Grasslands Bypass Project extension may impair reproduction or other essential behaviors of special-status and game fish species found in Reach 5 of the Restoration Area (e.g., Sacramento splittail, black bass, and striped bass). This impact would be **potentially significant**.~~ Future conditions for the No-Action Alternative include the Westside Regional Drainage Plan (SJRECWA et al., 2003), which is anticipated to eliminate salt discharges to the San Joaquin River from the Grasslands Drainage Area and improve water quality conditions within Reach 5 and the San Joaquin River from the Merced River to the Delta. This impact would be **less than significant** and **beneficial**.

No existing water quality impairments have been identified within Reaches 1 and 2 (Friant Dam to Mendota Dam) that may affect special-status fish (e.g., Kern brook lamprey and hardhead) or game species (i.e., black bass, striped bass, and rainbow trout). However, Reaches 4 and 5 are currently 303(d)-listed for mineral contaminants (e.g., arsenic, boron), mercury, and pesticides (e.g., chlorpyrifos, 1,1,1-Trichloro-2, 2-bis(4-chlorophenyl)ethane (DDT), diazinon, Group A pesticides, unknown toxicity). ~~The scheduled implementation of TMDLs for the pollutants discussed above from 2011 through 2021 may potentially reduce pollutant levels introduced by the Grasslands Bypass Project extension. However, a~~Although the affected special-status species in Reaches 4 and 5 have been found to be relatively tolerant of environmental degradation (Brown 2000), potential impacts may occur at even low pollutant levels, ranging from olfactory and neurological impairment to direct toxicity (Moore and Waring 1996). However, the implementation of anticipated actions in the region, including the Westside Regional Drainage Plan (SJRECWA et al., 2003), are anticipated to eliminate salt discharges to the San Joaquin River from the Grasslands Drainage Area and improve water quality conditions within Reach 5 and the San Joaquin River from the Merced River to the Delta. Therefore, these impacts would be ~~potentially significant~~ less than significant and beneficial.

Page 5-69 lines 1-26:

Impact FSH-3 (No-Action Alternative): ***Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River – Program-Level.*** ~~Under the No-Action Alternative, potential increased discharges and nonpoint source runoff of suspended sediments because of the planned Grassland Bypass Project extension may affect special-status and game fish species found in Reach 5 of the~~

~~Restoration Area (e.g., Sacramento splittail, black bass, and striped bass). This impact would be **potentially significant**.~~ Future conditions for the No-Action Alternative include the Westside Regional Drainage Plan (SJRECWA et al., 2003), which is anticipated to eliminate salt discharges to the San Joaquin River from the Grasslands Drainage Area and improve water quality conditions within Reach 5 and the San Joaquin River from the Merced River to the Delta. This impact would be **less than significant**.

No existing water quality impairments have been identified within the study reaches related to sedimentation/siltation and recent DFG (2007) monitoring data collected during seasonal habitat and fish sampling surveys from 2003 through 2005 indicate relatively low turbidity in upstream reaches (Reach 1 with a mean of 1 to 2 nephelometric turbidity units (NTU), Reach 2 with a mean around 5 NTU). However, DFG (2007) surveys indicate higher turbidity levels (mean of 20 to 35 NTU) downstream from agricultural inputs from Bear Creek, and Salt and Mud sloughs in Reaches 4 and 5. Potential direct impacts of turbidity and suspended sediment on fish include reduced avoidance or alarm reactions, displacement from key habitats, physiological stress and respiratory impairment, gill damage, reduced tolerance to disease and toxicants, and direct mortality (Newcombe and Jensen 1996, Bash et al. 2001). ~~The scheduled implementation of TMDLs for the pollutants discussed above between 2011 and 2021 may potentially reduce pollutant levels introduced by the Grassland Bypass Project extension.~~ However, although the affected special-status species in Reaches 4 and 5 have been found to be relatively tolerant to high turbidity (Brown 2000), existing water quality impairments (Central Valley RWQCB 2009) may be related to contaminant sorption on suspended sediments, which can cause a range of impacts ranging from olfactory and neurological impairment to direct toxicity (Moore and Waring 1996). Therefore, these impacts would be potentially significant.

Page 5-74 lines 7-27:

Impact FSH-10 (Alternatives A1 and A2): ***Effects to Fall-Run Chinook Salmon from Hybridization Resulting from Reintroduction of Spring-Run Chinook Salmon to the Restoration Area – Program-Level.*** Reintroduction of spring- and fall-run Chinook salmon to the Restoration Area could result in compromised genetic integrity and fitness of wild Chinook salmon stock in the major San Joaquin River tributaries via hybridization. However, because the overlap in spawn timing is minimal, there would likely be less hybridization occurring between the two runs, and spring-run Chinook salmon redds in the tributaries could be destroyed through superimposition, reducing the likelihood of returning adult migrants in following years. ~~However, because holding habitat is minimal for spring-run Chinook salmon in the San Joaquin River tributaries, the likelihood of genetic introgression is substantially reduced. Additionally, f~~Fall-run Chinook are already considered genetically compromised. Therefore, this impact would be **less than significant**.

Reintroduction of spring-run Chinook salmon could result in compromised genetic integrity and fitness of wild fall-run Chinook salmon stocks in the Merced, Tuolumne, and Stanislaus rivers if interbreeding between wild and hatchery fish occurred. Spring-run Chinook salmon tend to spawn between August and October, while fall-run Chinook salmon generally spawn from October through December. Therefore, there is potential for some degree of hybridization between the two runs. However, because the overlap in spawn timing is minimal, there would likely be less hybridization occurring between the two runs, and spring-run Chinook salmon redds in the tributaries could be destroyed through superimposition, reducing the likelihood of returning adult migrants in following years. ~~However, holding habitat is minimal for spring-run Chinook salmon in the tributaries; therefore, survival to spawning is likely to be reduced, thus reducing the degree of potential interbreeding. Additionally, a~~ A stock selection plan is being drafted by the Fisheries Management Work Group, along with a Hatchery and Genetics Management Plan, to help minimize potential genetic impacts to salmonids in the San Joaquin River and its tributaries. This impact would be less than significant.

Page 5-75, line 40:

withdrawal of water that would occur at ~~new pumping~~ existing infrastructure, potentially

Page 5-82, line 12-13:

previously described for program-level impacts. This impact would be **~~potentially significant~~ less than significant** and **beneficial**.

Page 5-82, lines 17-18:

previously described for program-level impacts. This impact would be **~~potentially~~ less than significant**.

Page 5-84 lines 29-42:

Impact FSH-18 (Alternatives A1 through C2): ***Changes in Fish Habitat Conditions in the San Joaquin River Upstream from Friant Dam – Project-Level.*** Changes in reservoir surface levels predicted for Alternatives A1 through C2 are expected to increase the quality of and quantity of habitat for representative species upstream from Friant Dam, including spotted bass, hardhead, rainbow trout, Kern brook lamprey, largemouth bass, smallmouth bass, ~~and~~ striped bass, and American shad. This impact would be **less than significant** and **beneficial**.

The most likely effect on habitat connectivity would stem from ~~re~~operations that resulted in a decrease in reservoir surface level that exposed a barrier to migration in a previously inundated portion of the channel of the San Joaquin River or other tributary of the reservoir. No such barrier is known to exist in the inundated channels of the reservoir tributaries. The specific effects on representative species upstream from Friant Dam, including spotted bass, hardhead, rainbow trout, Kern brook lamprey, largemouth bass, smallmouth bass, and striped bass, and American shad, are described below.

Page 5-88 lines 1-15:

Striped Bass and American Shad Habitat. Changes in reservoir surface levels predicted for Alternatives A1 through C2 are expected to reduce the surface area of reservoir open-water habitat for striped bass and improve the quality of striped bass spawning habitat at the mouth of the San Joaquin River in upper Millerton Lake. Alternatives A1 through C2 are also expected to affect food web support for striped bass. Even though the reservoir elevations are expected to be reduced, the operations at Kerckhoff Powerhouse are not expected to change, therefore not affecting the spawning habitat conditions for American shad. The expected net impact on striped bass and American shad from these changes would be less than significant and beneficial.

Open water habitat of Millerton Lake, quantified as mean reservoir surface area from April through September, would be reduced by Alternatives A1 through C2. The mean surface area of open-water habitat would be reduced from about 3,883 to 3,605 acres, a reduction of 7 percent. Of the fish species selected for analysis, striped bass would be the most likely to be affected by this change.

Alternatives A1 through C2 are also expected to cause a small increase in the length of San Joaquin River channel not inundated by the reservoir, which would likely provide slightly improved spawning conditions for striped bass. Overall, the net impact on striped bass from these changes would be less than significant and beneficial.

Backwater from Kerckhoff No. 2 Powerhouse affected hydraulic conditions in the American shad spawning areas. Studies conducted when the reservoir was full showed that at least 3,000 cfs was needed from Kerckhoff No. 2 Powerhouse to produce adequate flow velocities in the upper reservoir. Much less discharge was needed to produce adequate flow velocities when the lake elevation was below 545 msl. Kerckhoff Lake has too little storage to sustain discharge rates of 3,000 cfs for long, so the river upstream from Kerckhoff No. 2 Powerhouse may be the only area with suitable hydraulic conditions for American shad spawning when the reservoir is at the top of active storage; releases from Kerckhoff Powerhouse may be needed to provide adequate spawning flows. At lower reservoir levels, between about elevation 530 msl and 540 msl, the studies showed that at least 775 cfs of flow is required from the Kerckhoff No. 2 Powerhouse to produce adequate flow velocities in the upper arm of the reservoir for spawning. At this flow, the reservoir plunge point is far enough downstream to give the eggs time to complete development. The results of the PG&E studies have led to FERC-mandated minimum flow release requirements from Kerckhoff No. 2 Powerhouse and/or Kerckhoff Powerhouse during the American shad spawning season (PG&E 2001).

Page 5-91, line 5:

River, ~~but would not be anticipated to~~ through short-term mobilizatione of existing pollutants and long-term decreases in pollutant concentrations in the San Joaquin River. Continued discharges

Page 5-91, lines 25-26:

Short-term surface water quality impacts would occur under the action alternatives because constituents that may have accumulated in Reach 4B1, including pollutants associated with agricultural practices in the region, would be flushed from sediments within the river channel. On a long-term basis, the action alternatives would improve San Joaquin River water quality conditions within Reach 4B1 compared to the No-Action Alternative. Interim and Restoration flows are not expected to impact the San Joaquin River from Friant Dam to the Merced River by mobilizing pollutants outside of reach 4B1. Interim and Restoration flows

Page 5-96, lines 1-10:

~~The parasite *Myxobolus cerebralis*, which causes whirling disease in salmonids, poses a risk to salmonid populations in the San Joaquin River and tributaries. This parasite uses tubifex worms as an intermediate host, and has the potential, albeit a very low risk, to originate from the tubifex worm farm located in Reach 1A and infect fall-run Chinook salmon and steelhead entering Reach 1A from the lower San Joaquin River. Transmission of this or other diseases borne by the resident hatchery rainbow trout to fall-run Chinook salmon and steelhead in the lower San Joaquin River could also occur if infected rainbow trout move downstream following the release of Interim and Restoration flows. The resulting effects on wild populations of fall-run Chinook salmon and steelhead in the lower San Joaquin River and tributaries would be potentially significant.~~

Rainbow trout from the Stanislaus River have been previously detected with *Myxobolus cerebralis* (Modin 1998). *Myxobolus cerebralis* is a parasite that causes whirling disease in salmonids which is transmitted by the oligochaete host tubifex worm (*Tubifex tubifex)* (Wagner 2002). The tubifex worm has been identified as the only known host of *Myxobolus cerebralis*; other genera of oligochaetes have been tested, but did not produce infectivity for whirling disease (Markiw and Wolf 1983). Noteworthy is an aquatic worm harvesting operation at San Joaquin Fish Hatchery. The aquatic worms feed on the solid waste from the hatchery's effluent. DFG conducted preliminary investigations on the species composition at the site in 2009. Findings indicated that the dominant oligochaete harvested at the site is from the Family Lumbriculidae, though a small percentage of tubifex worms were observed (P. Adelizi pers. com.).

Although *Myxobolus cerebralis* is present in several watersheds in California, no adverse effects on salmon or trout populations have been observed in California (Modin 1998). In general, rainbow trout are more susceptible to the disease than steelhead (O'Grodnick 1979, Hoffman 1990). Furthermore, susceptibility to infection varies among stocks and individual fish (Markiw 1992). Therefore, the impact would be less than significant.

Page 5-97, lines 14-17:

Under the action alternatives, flows on the tributaries almost always either meet the target flows ~~(as shown in Appendix K, "Biological Resources – Fisheries")~~ or, if not, then do not change from the No-Action Alternative or existing conditions. Flows on the tributaries would meet the target flows (listed in Table 5-11), as follows:

Page 5-100, lines 13-16:

Joaquin River inflow (see Chapter 14.0, "Hydrology – Surface Water Quality"). As described under Impact FSH-23, Interim and Restoration flows could mobilize constituents that may have accumulated in the San Joaquin River, including pollutants associated with agricultural practices in the region, resulting in short-term surface water quality impacts within the Restoration Area. Increased flow through the Restoration Area under the action alternatives would decrease concentrations of constituents in San Joaquin River flows. On a long-term basis, the action alternatives would improve San Joaquin River water quality conditions compared to the No-Action Alternative. ~~Other pollutants in the river would be similarly diluted. This effect does not extend very far into the Delta, perhaps because much of the increased San Joaquin River water volume entering the Delta would be offset by exports at the Jones and Banks Pumping Plants.~~

4.4 Chapter 6.0, "Biological Resources – Vegetation and Wildlife"

Page 6-1, lines 19-24:

~~Throughout this chapter, species are referred to using their common name. At the first usage of a common name, the Latin name is also presented in parentheses.Throughout this chapter, species are referred to using their common name. At the first usage of a common name, the Latin name is also presented in parentheses.Throughout this chapter, species are referred to using their common name. At the first usage of a common name, the Latin name is also presented in parentheses.~~

Page 6-3, lines 6–8:

Joaquin Valley. The preserves furnish important native habitats, including valley oak and mixed riparian forests and seasonal and permanent wetlands, to support and benefit wildlife species, ~~particularly those of special concern~~ including a number of sensitive species. Land preserves in or adjacent to

Page 6-4, Figure 6-1 is replaced with the following figure:

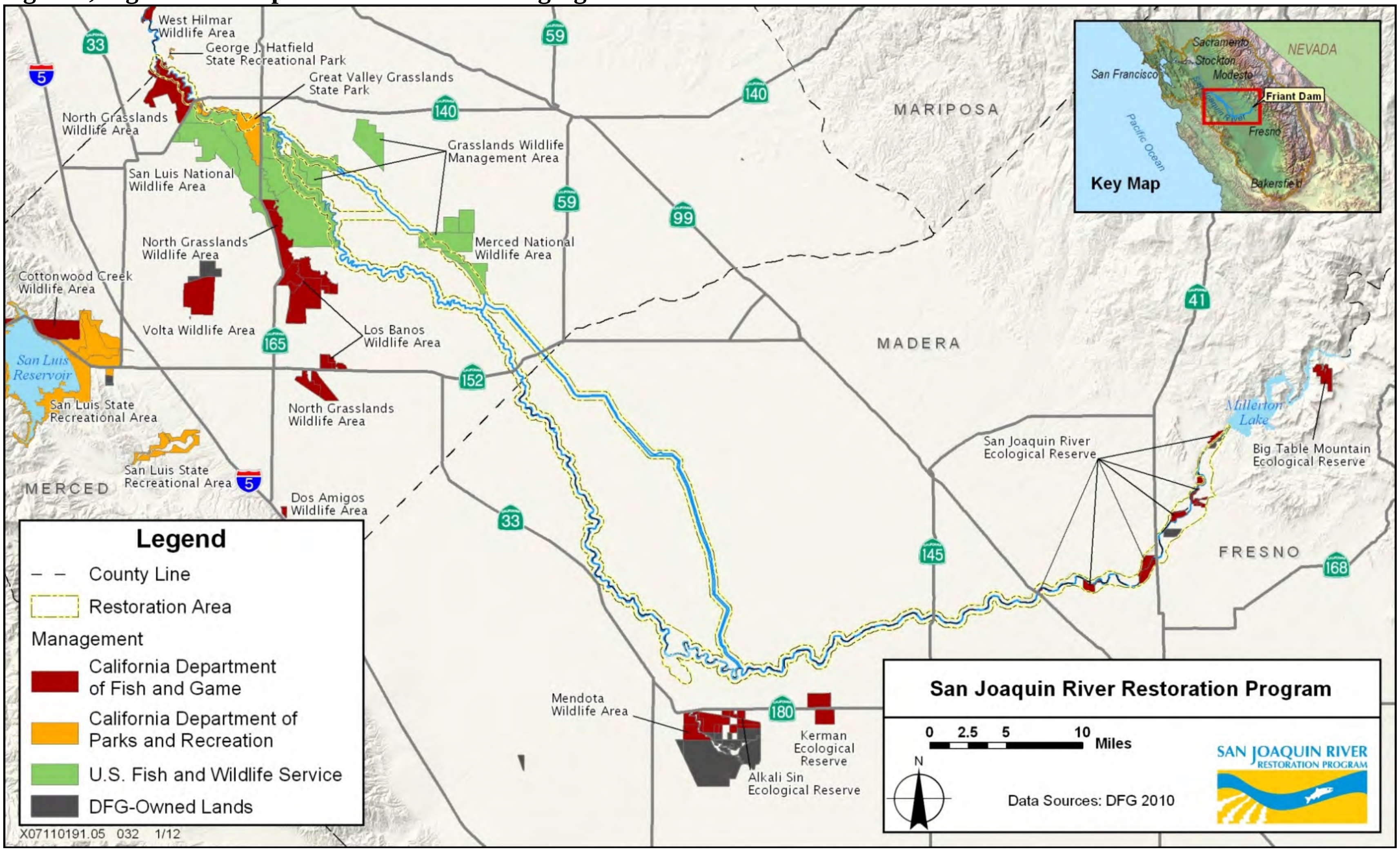


Figure 6-1.
Land Preserves in the Vicinity of the Restoration Area

Page 6-8, lines 29–32:

and Fremont cottonwood are present in small numbers. Common understory species in this vegetation type include creeping wild rye, California wild rose (*Rosa californica*), ~~Himalayan blackberry (*Rubus armeniacus*),~~ California wild grape (*Vitis californica*), ~~and~~ California blackberry (*Rubus ursinus*), and the nonnative Himalayan blackberry (*Rubus armeniacus*).

Page 6-9, lines 36–41:

common tule (*Schoenoplectus acutus* var. *occidentalis*) and cattails (*Typha* spp.). More ephemeral wetlands, especially along the margins of the river and in swales adjacent to the river, support an array of native and nonnative herbaceous species, including western goldenrod (*Euthamia occidentalis*), smartweed (*Polygonum* spp.), Mexican rush (*Juncus mexicanus*), horseweed (*Conyza canadensis*), willow herb (*Epilobium* spp.), saltgrass (*Distichlis spicata*), sunflower (*Helianthus* sp.), and the nonnative curly dock (*Rumex crispus*). Many

Page 6-10, lines 3–5:

and red-winged blackbird (*Agelaius phoeniceus*). Mammal species that use this habitat include California vole (*Microtus califonicus*), common muskrat (*Ondatra zibethicus*), and the nonnative Norway rat (*Rattus norvegicus*). Pacific chorus frog (*Pseudacris regilla*) and western

Page 6-10, lines 20–24:

cicutarium) and horseweed). Typical bird species associated with grasslands include northern harrier, ~~ring-necked pheasant (*Phasianus colchicus*),~~ mourning dove (*Zenaida macroura*), burrowing owl (*Athene cunicularia*), horned lark (*Eremophila alpestris*), loggerhead shrike (*Lanius ludovicianus*), ~~and~~ savannah sparrow (*Passerculus sandwichensis*), and the nonnative ring-necked pheasant (*Phasianus colchicus*). Mammal species that use grasslands include deer mouse (*Peromyscus*

Page 6-10, lines 37–39:

An herbaceous understory usually is lacking, but sparse cover of annual grasses, such as the nonnatives Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) and red brome (*Bromus madritensis* ssp. *rubens*), may be present. Alkali sinks flood seasonally, but do not flood

Page 6-11, lines 17–20:

cover typically are removed. Species that use orchards and vineyards, such as ground squirrel, American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), and the nonnative European starling (*Sturnus vulgaris*), often are considered agricultural pests.

Page 6-11, lines 23–24:

occurring water bodies. Open water areas provide habitat for waterfowl, pond turtle, Pacific chorus frog, and <u>the nonnative</u> bullfrog (*Rana catesbeiana*).

Page 6-11, lines 35–37:

uncommon. <u>The nonnative plants</u> Foxtail fescue, Bermuda grass (*Cynodon dactylon*), <u>and</u> red-stemmed filaree, <u>and the native plants</u> panicled willow herb (*Epilobium brachycarpum*), and lupine species (*Lupinus* spp.) are typically the most abundant plant species on riverwashes in the Restoration Area.

Page 6-24, line 15:

snail has not been documented in the Restoration Area (<u>Benson 2011</u>~~DFG 2008b~~).

Page 6-28, lines 21–23:

Special-Status Wildlife Species. <u>In addition to birds whose only special-status is under the MBTA,</u> ~~A~~a total of 63 special-status wildlife species have been recorded historically in the region, and 61 are known or have potential to occur in the Restoration Area. Although historically known from the region, California red-legged

Page 6-32, lines 26–28:

Reach 1B. <u>With the exception of birds whose only special-status is under the MBTA</u>, ~~N~~no special-status plants or animals are identified in Reach 1B (DFG 2011a), largely because of the minimal amount of remnant native habitats along this stretch of the river. Nonetheless, it is likely that raptors and possibly other sensitive species associated

Page 6-32, line 40:

DFG (20<u>1</u>0~~8b~~) indicates that numerous nesting sites are present in the riparian forest and

Page 6-33, lines 4–8:

arrowhead (DFG 2011a). <u>Also,</u> ~~W~~<u>w</u>estern yellow-billed cuckoo (*Coccyzus americanus occidentalis*) <u>historically occurred</u> ~~has been documented~~ in the riparian and willow scrub habitats around the Mendota Pool<u>, and</u> ~~in the 1950s (DFG 2011a). B~~<u>b</u>ank swallows (*Riparia riparia*)~~, which use habitats along banks or bluffs usually adjacent to water, have been documented~~ <u>historically occurred</u> in the vicinity of the Mendota Pool. Several other special-status species have been documented

Page 6-33, lines 12–13:

Reach 3. Giant garter snake, western pond turtle, and <u>historically</u> western yellow-billed cuckoo are documented as occurring in suitable habitats in Reach 3. Occurrences of Swainson's

Page 6-36, lines 7–14:

The California condor (*Gymnogyps californianus*), lightfooted clapper rail (*Rallus longirostris levipes*), California least tern (*Sternula antillarum brownie*), least Bell's vireo (*Vireo bellii pusillus*), ~~Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*),~~ southwestern willow flycatcher (*Empidonax traillii extimus*), California gnatcatcher (*Polioptila californica*), Mohave ground squirrel (*Spermophilus mohavensis*), and Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) are examples of species that have been listed as threatened or endangered under the ESA and that could occur within the CVP/SWP water service areas.

Page 6-38, line 6:

management for beneficial uses of the Bay-Delta system. CALFED has released a Draft Ecosystem Restoration Program Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions (DFG 2011c). The Federal agencies involved

Page 6-64 through 6-68, Table 6-6:

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area

Species and Status[1]	Potential for Effects[2 3]
Vernal Pool Invertebrates conservancy fairy shrimp (FE, CH) longhorn fairy shrimp (FE, CH) vernal pool fairy shrimp (FT, CH) vernal pool tadpole shrimp (FE, CH)	High. Special-status vernal pool invertebrates are known to occur in uplands adjacent to the San Joaquin River and bypasses. Vernal pool habitat is present adjacent to Reaches 1A, 4B2, and 5, and the Eastside and Mariposa bypasses. Potentially suitable seasonal wetland habitat could be present within the Eastside and Mariposa bypasses. Potential for disturbance or loss of habitat would occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities. Ground disturbance could result in direct fill of vernal pools or indirectly affect hydrology and ecosystem function during work in upland habitats.
valley elderberry longhorn beetle (FT)	High. Valley elderberry longhorn beetle is known to occur in Reaches 1A and 2, and elderberry shrubs (potential habitat) are widespread along the San Joaquin River, especially in Reaches 1 and 2. Elderberry shrubs grow rapidly and may occur in additional areas that have not been surveyed or have grown in areas since the surveys were conducted. In addition, valley elderberry longhorn beetle could occur in more shrubs, as the exit hole surveys were not comprehensive and results may be outdated. Potential for disturbance or loss of habitat would occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; augmentation of spawning gravels; or other ground-disturbing activities, particularly where such activities are conducted near riparian habitats.
California tiger salamander (FT, CH, ST) western spadefoot (SSC)	Moderate. California tiger salamander and western spadefoot are not expected to occur within the San Joaquin River corridor, but may occur in uplands adjacent to the river or bypasses. Potential for disturbance or loss of aquatic breeding, upland forage, refuge, and dispersal habitat could occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities. Ground disturbance could result in direct loss of habitats or indirectly result in elimination of areas essential for seasonal movement.

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area (contd.)

Species and Status[1]	Potential for Effects[2 3]
giant garter snake (FT, ST) western pond turtle (SSC)	High. Giant garter snake is known to occur in Mendota Pool. Western pond turtle is likely to be widespread in slow-moving aquatic habitat where there are basking areas. Aquatic habitat could be affected during instream work to increase channel capacity, supplement spawning gravel, fill of gravel pits, modification of side channels, and installation of fish screens or other modification to diversion structures. Potential for disturbance or loss of upland nesting and aestivation habitat could occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities.
blunt-nosed leopard lizard (FE, SE, FP)	High. Blunt-nosed leopard lizard is known to occur in uplands adjacent to the San Joaquin River and bypasses. Potentially suitable habitat may be present within the Eastside Bypass. Potential for disturbance or loss of habitat could occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities.
California horned lizard (*Phrynosoma coronatum frontale*) (SSC) San Joaquin whipsnake (*Masticophis flagellum ruddocki*) (SSC)	Low. California horned lizard and San Joaquin whipsnake distribution in or adjacent to the Restoration Area is not known; however, suitable habitat is present. Disturbance or loss of habitat could occur during construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities. Because restoration projects would affect only a very small fraction of the grassland habitat that could support these species, potential impacts are not expected to result in a substantial adverse effect on the species, result in a substantial reduction in habitat, or cause the population to drop below self-sustaining levels.
silvery legless lizard (SSC)	Low. Silvery legless lizard is known to occur near the confluence with the Chowchilla Bypass Bifurcation Structure in Reach 2B and in Reach 5. This species has a narrow range and limited dispersal capability. It occurs in upland habitats characterized by sandy soils, and vegetation that produces leaf litter. Disturbance or loss of habitat could occur during construction of Mendota Pool Bypass and modification of the channel capacity of Reach 2B. Disturbance to upland habitats for the species is not expected to result in a substantial adverse effect on the species, result in a substantial reduction in habitat, or cause the population to drop below self-sustaining levels.

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area (contd.)

Species and Status[1]	Potential for Effects[2,3]
Birds Breeding in Emergent Marsh redhead (*Aythya americana*) (SSC) least bittern (*Ixobrychus exilis*) (SSC) tricolored blackbird (SSC) yellow-headed blackbird (*Xanthocephalus xanthocephalus*) (SSC)	Moderate. In-channel wetland and riparian vegetation within Reaches 2B and 4B1 would be removed to improve flow conveyance and to construct a low-flow channel. This vegetation and associated wetlands may provide nesting habitat for redhead, least bittern, tricolored blackbird, and yellow-headed blackbird. Establishment of new low-flow channels within other river reaches for fish passage could involve vegetation removal, dredging, grading, and recontouring activities. Isolation or fill of the gravel pits may also remove marsh vegetation. These activities could result in loss or disturbance to birds nesting in marsh habitat if construction occurs during the breeding season. Temporary loss of habitat may occur during construction. Settlement actions may result in long-term beneficial effects to riparian and marsh habitats through creating more flood plain and managing invasive plant species.
Birds Nesting in Trees and Shrubs Swainson's hawk (ST) white-tailed kite (FP) western yellow-billed cuckoo (FC, SE) loggerhead shrike (SSC)	High. Swainson's hawk are known to nest in almost every reach of the river. White-tailed kite and loggerhead shrike could nest throughout the river corridor where there is suitable nesting habitat. Western yellow-billed cuckoo are rare throughout the river corridor. Disturbance from construction of setback levees, bypass structures, haul and access roads, and staging areas; augmentation of spawning gravels; or other ground-disturbing activities could result in loss of trees and shrubs occupied by nesting birds if construction occurs during the breeding season.
Birds Nesting Low and on Ground northern harrier (SSC) short-eared owl (*Asio flammeus*) (SSC) burrowing owl (SSC) least Bell's vireo (FE, SE) yellow warbler (SSC) yellow-breasted chat (SSC) grasshopper sparrow (*Ammodramus savannarum*) (SSC)	Moderate. Northern harrier, grasshopper sparrow, and short-eared owl nest in tall grasslands, crops, or wetland vegetation; burrowing owl nests in sparsely vegetated open grasslands; least Bell's vireo, yellow warbler, and yellow-breasted chat nest in riparian scrub and woodlands. Northern harrier, burrowing owl, short-eared owl, and grasshopper sparrow are expected to nest in suitable habitats in the Restoration Area. Least Bell's vireo was rediscovered nesting at the San Joaquin River NWR in 2006, but is not expected to nest in the Restoration Area. Yellow warbler also nests at the San Joaquin River NWR and may nest in potentially suitable habitat throughout the Restoration Area. ~~and~~ ~~y~~Yellow-breasted chat currently ~~are~~is not known to nest within the San Joaquin Valley. Although these species are not known to currently nest in the Restoration Area, potentially suitable habitat may be present. Disturbance during construction of setback levees, bypass structures, haul and access roads, and staging areas; augmentation of spawning gravels; or other ground-disturbing activities could result in loss of low- and ground-nesting birds if construction occurs during the breeding season.

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area (contd.)

Species and Status[1]	Potential for Effects[2 3]
bald eagle (FD, SE, FP)	Low. Bald eagle are reported to nest along the Chowchilla Bypass (Dulik, pers. Comm. 2008), and historically may have nested elsewhere within the Restoration Area. Suitable foraging habitat may be present in areas of slow moving open water where prey species such as waterfowl, shorebirds, or fish are present. Construction activities are unlikely to substantially reduce the amount of foraging habitat in the area.
American peregrine falcon (*Falco peregrinus anatum*) (FD, SE, FP)	Low. American peregrine falcon is unlikely to nest near the San Joaquin River. Suitable foraging habitat may be present in areas of slow moving open water where prey species such as waterfowl, shorebirds, or fish are present. Construction activities are unlikely to substantially reduce the amount of foraging habitat in the area.
Birds Wintering in Grasslands and Agricultural Fields greater sandhill crane (ST, FP) lesser sandhill crane (SSC) mountain plover (*Charadrius montanus*) (SSC)	Low. These special-status birds may use grasslands or agricultural fields adjacent to San Joaquin River and bypass system to forage in winter. Potential for disturbance or loss of habitat could occur during construction of setback levees, bypass structures, haul and access roads, staging area, modifications to channels in the bypass system, or other ground-disturbing activities. Because grassland and agricultural fields are relatively common in the Restoration Area, potential impacts are not expected to result in loss of individuals, a substantial adverse effect on the species, or a substantial reduction in habitat, or cause the population to drop below self-sustaining levels.
Bank swallow (ST)	Low. There is a historical nesting location for bank swallow at Mendota Pool. However, this nesting colony was last reported in 1980 (DFG 2011a). The current population of bank swallows is restricted to portions of the upper Sacramento River, with a few colonies located on the central and north coast, in northeastern California, and in Mono and Inyo counties (DFG 2005).
Special-Status Bats pallid bat (*Antrozous pallidus*) (SSC) Townsend's big-eared bat (*Corynorhynus townsendii*) (SSC) spotted bat (SSC) western red bat (*Lasiurus blossevillii*) (SSC) western mastiff bat (SSC)	Moderate. Bat roosts are not known to occur in the Restoration Area; however, buildings, bridges, tree hollows, or other structures could provide suitable habitat. Disturbance during modifications to bridges or road crossings, construction of setback levees and bypass structures, modifications to channels in the bypass system, or other ground-disturbing activities could result in loss of roosting colonies.

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area (contd.)

Species and Status[1]	Potential for Effects[2 3]
riparian brush rabbit (FE, SE)	Low. Riparian brush rabbit is unlikely to occur in the Restoration Area. Only known to occur in limited areas near San Joaquin River NWR, downstream from proposed construction activities.
Nelson's antelope squirrel (ST)	Moderate. Nelson's antelope squirrel is known to occur near the Mendota Pool. Construction of the Mendota Bypass or channel modifications in Reach 2B could affect this species.
Fresno kangaroo rat (FE, CH)	Moderate. Recent trapping surveys have not detected this species along the San Joaquin River (ESRP 2004). Populations may still occur at Alkali Sink Ecological Reserve and Mendota Wildlife Areas or other private lands where suitable habitat could exist. Construction activities and facility modifications are unlikely to affect known populations, but could affect habitat on private land adjacent to Reach 2B that has not been surveyed.
Riparian (San Joaquin Valley) woodrat (FE, SCC) ringtail (*Bassariscus astutus*) (FP)	Low. The distribution of these two special-status mammals is not well known. Although species are not known to occur in the Restoration Area, potentially suitable habitat is present. Ringtail is unlikely to occur on the valley floor in the San Joaquin Valley. Riparian woodrat populations are greatly reduced, with the only known population at Caswell Memorial State Park with a possible second population near Vernalis, downstream from the Restoration Area.
American badger (SSC)	Low. American badger presence in the Restoration Area is unknown; however, suitable habitat is present. Because grassland and agricultural fields are relatively common in the Restoration Area, potential impacts are not expected to result in a substantial adverse effect on the species, result in a substantial reduction in habitat, or cause the population to drop below self-sustaining levels.

Table 6-6.
Programmatic Evaluation of Potential Effects from Construction and Modification of Facilities and Other Restoration Projects on Special-Status Wildlife Species in the Restoration Area (contd.)

Species and Status[1]	Potential for Effects[2 3]
San Joaquin kit fox (FE, ST)	Moderate. San Joaquin kit fox has been observed in the Restoration Area. Construction of setback levees, bypass structures, haul and access roads, and staging areas; modifications to channels in the bypass system; or other ground-disturbing activities could result in loss or disturbance to dens.

Notes:
[1] Legal Status Definitions:
U.S. Fish and Wildlife Service Federal Listing Categories:
CH = Designated Critical Habitat
FC = Candidate
FD = Delisted
FE = Endangered
FT = Threatened
California Department of Fish and Game State Listing Categories:
FP = Fully Protected
SC = Candidate
SE = Endangered
SSC = Species of Special Concern (no formal protection):
ST = Threatened
[2] Describes potential effects that would be avoided and minimized by conservation measures of the Conservation Strategy. (These measures are described in Chapter 2.0, “Description of Alternatives.”)
[3] Potential for Effects Definitions:
High: The species is expected or known to occur in multiple areas or large geographic areas that could be affected by major construction or ground disturbance. The potential for adverse effects is considered high given the rarity of the species and the potential magnitude of the effects.
Moderate: Habitat conditions, behavior of the species, known occurrences in the project vicinity, or other factors indicate a relatively high likelihood that the species would occur at the project site. The potential for adverse effects is considered moderate given the rarity of the species and the potential magnitude of the effects.
Low: Suitable habitat is available at the project site; however, there are little to no other indicators that the species might be present and/or potential habitat is not likely to be adversely affected by the proposed activities or the activities would be beneficial. The potential for adverse effects is considered low given the rarity of the species and the potential magnitude of the effects.
Key:
NWR = National Wildlife Refuge
SJRRP = San Joaquin River Restoration Program

4.5 Chapter 8.0, "Cultural Resources"

Page 8-3, line 8:

(Cook 1955, 1960; Gayton 1936, as cited in Byrd et al. 2009; Wallace 1978). Villages were composed of large,

Page 8-12, line 20:

California Register of Historic Places.

Title to all archaeological sites and historic or cultural resources on or in submerged lands of California is vested in the State and under the jurisdiction of the California State Lands Commission. Any submerged archaeological site or submerged historic resource remaining in State waters for more than 50 years is presumed to be archaeologically or historically significant. The recovery of objects from any submerged archaeological site requires a salvage permit under Public Resources Code Section 6309.

Page 8-18, line 34:

~~alternative~~ would do any of the following:

4.6 Chapter 9.0, "Environmental Justice"

Page 9-26 through 9-28, Table 9-10:

Table 9-10.
Impacts Potentially Causing Adverse Environmental Justice Effects

Alternative	Impact	Potential for Disproportionately High and Adverse Effects on Minority and Low-Income Populations
Environmental Justice: Program-Level		
No-Action	AIR-1: Construction-Related Emissions of Criteria Air Pollutants and Precursors	Yes
	AIR-2: Long-Term Operations-Related Emissions of Criteria Air Pollutants and Precursors	Yes
	AIR-3: Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants	Yes
	AIR-4: Exposure of Sensitive Receptors to Odor Emissions	No
	FSH-1: Changes in Water Temperatures in the San Joaquin River Between Friant Dam and the Merced River	Yes
	~~FSH-2: Changes in Pollutant Discharge in the San Joaquin River Between Friant Dam and the Merced River~~	~~Yes~~
	~~FSH-3: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River~~	~~Yes~~
	VEG-3: Facilitate Increase in Distribution and Abundance of Invasive Plants in the Restoration Area	No
	VEG-10: Facilitate Increase in Distribution and Abundance of Invasive Plants Between the Merced River and the Delta	No
	LUP-1: Conversion of Important Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	Yes
	UTL-1: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	Yes
	UTL-3: Potential for Insufficient Water Supply and Resources in the Restoration Area	Yes
	UTL-6: Potential for Insufficient Existing Water Supply and Resources Between the Merced River and the Delta	Yes

**Table 9-10.
Impacts Potentially Causing Adverse Environmental Justice Effects (contd.)**

Alternative	Impact	Potential for Disproportionately High and Adverse Effects on Minority and Low-Income Populations
Environmental Justice: Program-Level (contd.)		
A1-C2	AIR-1: Construction-Related Emissions of Criteria Air Pollutants and Precursors	Yes
	CLM-1: Construction-Related Emissions of GHGs in the Restoration Area	No
	LUP-1: Conversion of Important Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	Yes
	LUP-3: Conflict with Adopted Land Use Plans, Goals, Policies, and Ordinances of Affected Jurisdictions	Yes
	NOI-1: Exposure of Sensitive Receptors to Generation of Temporary and Short-Term Construction Noise	Yes
	NOI-2: Exposure of Sensitive Receptors to Increased Off-Site Traffic Noise Levels	Yes
	TRN-1: Reduced Traffic Circulation and Roadway Capacity	Yes
	VIS-2: Long-Term Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character	No
Environmental Justice: Project-Level		
No-Action	AIR-5: Construction-Related Emissions of Criteria Air Pollutants and Precursors	Yes
	AIR-6: Operations-Related Emissions of Criteria Air Pollutants and Precursors	Yes
	AIR-7: Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants	Yes
	AIR-8: Exposure of Sensitive Receptors to Odor Emissions	No
	FSH-15: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Upstream from Friant Dam	Yes
	FSH-22: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the San Joaquin River Between Friant Dam and the Merced River	Yes
	~~FSH-23: Changes in Pollutant Discharge and Mobilization in the San Joaquin River Between Friant Dam and the Merced River~~	~~Yes~~
	~~FSH-24: Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River~~	~~Yes~~

Table 9-10.
Impacts Potentially Causing Adverse Environmental Justice Effects (contd.)

Alternative	Impact	Potential for Disproportionately High and Adverse Effects on Minority and Low-Income Populations
Environmental Justice: Project-Level (contd.)		
No-Action	FSH-31: Changes in Water Temperatures and Dissolved Oxygen Concentrations in the Delta	Yes
	FSH-38: Salinity Changes in the Delta	No
	FSH-39: Changes to Delta Inflow and Flow Patterns in the Delta	Yes
	VEG-18: Facilitate Increase in Distribution and Abundance of Invasive Plants in Sensitive Natural Communities in the Restoration Area	No
	GRW-4: Changes in Groundwater Levels in CVP/SWP Water Service Areas	Yes
	GRW-5: Changes in Groundwater Quality in CVP/SWP Water Service Areas	Yes
	SWS-5: Change in Recurrence of Delta Excess Conditions	No
	UTL-9: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	Yes
	UTL-11: Potential for Insufficient Water Supply and Resources ~~in the Restoration Area~~	Yes
A1-C2	CLM-4: Operational Emissions of GHGs in the Delta	No
	GRW-4: Changes in Groundwater Levels in CVP/SWP Water Service Areas	Yes
	GRW-5: Changes in Groundwater Quality in CVP/SWP Water Service Areas	Yes
	LUP-5: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Inundation and/or Soil Saturation	Yes
	LUP-8: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Water Deliveries	Yes
	UTL-11: Potential for Insufficient Existing Water Supply and Resources	Yes
	~~UTL-16: Potential for Insufficient Existing Water Supply and Resources from Recapture of Interim and Restoration Flows Between the Merced River and the Delta~~	~~No~~

Key:
CVP = Central Valley Project
Delta = Sacramento-San Joaquin Delta
GHG = greenhouse gas
SWP = State Water Project

Page 9-31, lines 17-33:

~~**Impact FSH-2 (No-Action Alternative):** ***Changes in Pollutant Discharge in the San Joaquin River Between Friant Dam and the Merced River – Program-Level.*** Under the No-Action Alternative, potential increased discharges and nonpoint source runoff of agricultural pollutants because of the planned Grassland Bypass Project extension may impair reproduction or other essential behaviors of special-status and game fish species found in Reach 5 of the Restoration Area (e.g., Sacramento splittail, black bass, striped bass). This analysis and conclusion is similar to Impact FSH-1 (No-Action Alternative). Disproportionately high and adverse effects on low-income populations **could occur**.~~

~~**Impact FSH-3 (No-Action Alternative):** ***Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River – Program-Level.*** Under the No-Action Alternative, potential increased discharges and nonpoint source runoff of suspended sediments because of the planned Grassland Bypass Project extension may affect special-status and game fish species found in the San Joaquin River downstream from the Merced River confluence (e.g., Sacramento splittail, black bass, striped bass). This analysis and conclusion is similar to Impact FSH-1 (No-Action Alternative). Disproportionately high and adverse effects on low-income populations **could occur**.~~

Page 9-37, lines 9-18:

~~**Impact FSH-23 (No-Action Alternative):** ***Changes in Pollutant Discharge and Mobilization in the San Joaquin River Between Friant Dam and the Merced River – Project-Level.*** This analysis and conclusion is the same as Impact FSH-3 (No-Action Alternative) above. Disproportionately high and adverse effects on low-income populations **could occur**.~~

~~**Impact FSH-24 (No-Action Alternative):** ***Changes in Sediment Discharge and Turbidity in the San Joaquin River Between Friant Dam and the Merced River – Project-Level.*** This impact is the same as Impact FSH-23 (No-Action Alternative), previously described for program-level impacts. Disproportionately high and adverse effects on low-income populations **could occur**.~~

Page 9-41, lines 3-26:

UTL-11 (Alternatives A1 through C2): ***Potential for Insufficient Existing Water Supply and Resources in the Restoration Area – Project-Level.*** Proposed changes resulting from Alternatives A1 through C2 could result in insufficient water supply entitlements in the Friant Division~~Restoration Area~~, which includes the counties of Fresno, Kern, Kings, Madera, ~~and~~ Merced, and Tulare. There are no mitigation measures that could reduce the impact of these changes in water supply to less than significant. The six~~three~~ counties exhibit proportions of minority residents in excess of 50 percent and communities exhibiting high proportions of low income residents. Thus, disproportionately high and adverse impacts related to water supply would occur in residential areas within the counties with high proportions of minority and low-income residents. Disproportionately high and adverse effects on minority and low-income populations could occur.

~~**UTL-16 (Alternatives A1 through C2):** ***Potential for Insufficient Existing Water Supply and Resources from Recapture of Interim and Restoration Flows Between the Merced River and the Delta – Project-Level.*** Proposed changes resulting from Alternatives A1 through C2 could result in insufficient water supply and resources between the Merced River and the Delta, which includes Stanislaus County. There are no mitigation measures that could reduce the impact of these changes in water supply to less than significant. The county as a whole does not exhibit a proportion of minority or low-income residents meaningfully greater than the State, and no individual communities within Stanislaus County exhibit high proportions of minority or low-income residents. Consequently, the distribution of impacts within this county would not disproportionately accrue to minority or low-income residents compared with the general population of Stanislaus County. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.~~

4.7 Chapter 10.0, "Geology and Soils"

Page 10-25, line 11:

between Friant Dam and SR 99 (SJRC 2000~~1992~~). The SJRC, a regionally governed agency

4.8 Chapter 11.0, "Hydrology – Flood Management"

Page 11-2, line 28:

Madera, and Friant-Kern canals~~ (California State Legislature 1933)~~. The act authorized

Page 11-2, line 32:

With the passage of the Rivers and Harbors Act of 1935~~ (U.S. Congress 1935)~~, Congress

Page 11-2, line 40:

Project ~~(U.S. Congress 1944)~~. The project included constructing levees on the San

Page 11-3, line 4:

Flood Control Act of 1962~~ (U.S. Congress 1962)~~. The Chowchilla and Eastside bypasses

Page 11-6, lines 8-9:

Source: Reclamation, 2005.
Key: TAF = thousand acre-feet
Note: During periods of large snowpack, operations to control snowmelt runoff may exceed the 170 TAF flood control space.

Page 11-6, line 20:

~~the Kings River and other~~ tributaries, downstream to the mainstem just above Merced

Page 11-7, Figure 11-2 is replaced with the following figure:

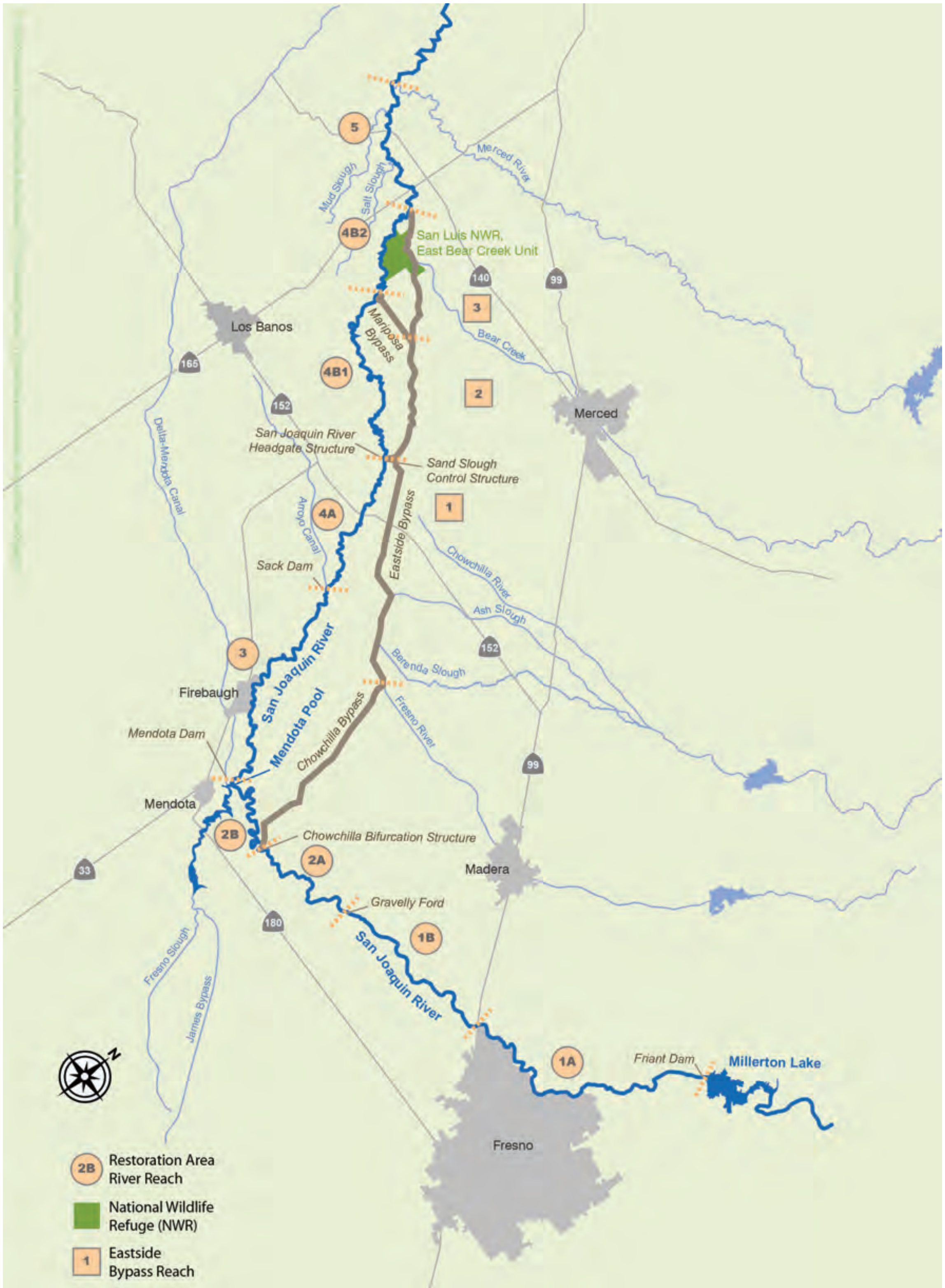


Figure 11-2.
Existing Flood Management Facilities in the San Joaquin River Basin

Page 11-9, lines 40-42:

Sack Dam. Sack Dam is a 5-foot-high low-head structure used to ~~control water released from the Delta-Mendota Canal~~ divert water from Reach 3 of the San Joaquin River into Arroyo Canal. c ~~All flows conveyed through San Joaquin River Reach 3 of less than 600 cfs are diverted into Arroyo Canal. Larger flows~~

Page 11-10, lines 1-2:

Flood flows generally pass the canal and continue downstream to San Joaquin River Reach 4A and are subsequently diverted into the Eastside Bypass at the Sand Slough Control Structure.

Page 11-10, line 10:

via the James Bypass to the Mendota Pool, and has a design capacity of 4,750 cfs (DWR 1985). Excess water in the Mendota Pool

Page 11-10, line 22:

reservation of 475 TAF. During periods of large snowpack, operations to control snowmelt runoff may exceed the 475 TAF rain flood control space. The major goal of the flood operations at Pine Flat Dam, and

Page 11-10, lines 28-35:

(north to the San Joaquin River). ~~Although constructed by, and under the jurisdiction of, USACE, permission was granted to the Kings River Water Association to~~ operate ~~the structure according to agreements among the water users. The association~~ operates ~~the weir to maximize flow north into the San Joaquin River up to a total of 4,750 cfs to partially relieve flooding within the Tulare Lake bed to the south. When flows exceed 4,750 cfs, the excess, up to 1,200 cfs, is diverted to the south. All flows over 5,950 cfs are sent north until maximum diversions at the Crescent Weir are reached.~~ During flood periods (flood control releases are being made from Pine Flat Dam), the operation of Army Weir is under USACE jurisdiction. During these flood periods, physical operation of the structure is accomplished by the Kings River Conservation District. For flows that exceed 4,750 cfs, the excess, up to 3,200 cfs, is diverted to the south (to Tulare Lakebed) at various diversions (including Army Weir). All flows greater than 7,950 cfs are divided equally or as dictated by prevailing conditions.

Page 11-10, line 36 to page 11-11, line 4:

- **Crescent Weir.** The Crescent Weir, downstream from the Army Weir, began operation on Kings River North in 1939; it is maintained and operated by the Crescent Canal Company under an agreement with the Zalda Reclamation District. The concrete weir has 18 openings and uses flashboards for flow control. ~~The Zalda Reclamation District controls flows greater than 4,750 cfs at the Crescent Weir by sending the first 4,750 cfs north, and the excess, up to a~~

> ~~maximum of 2,000 cfs, to the south. Flows greater than 7,950 cfs in the Kings River North (4,750 cfs north, 1,200 cfs south from the Army Weir, and 2,000 cfs south from the Crescent Weir) are divided by the Army and Crescent weirs equally between north and south, respectively, with consideration of existing levee and channel conditions.~~ During flood operation (flood control releases are being made from Pine Flat Dam), the operation of Crescent Weir is under USACE jurisdiction. During these flood periods, physical operation of the structure is accomplished by the Kings River Conservation District. For Kings River flows reaching Crescent Weir, the first 4,750 cfs is sent north, to the San Joaquin River. For flows higher than 4,750 cfs, up to 3,200 cfs, sent south (to Tulare Lakebed) at various diversions. All flows greater than 7,950 cfs are divided equally or as dictated by prevailing conditions.

Page 11-11, line 12:

TAF and a flood management reservation of 65 TAF and a downstream objective release of 5,000 cfs. Hensley Lake is formed by

Page 11-11, line 16:

City of Chowchilla and the ~~highly developed~~ agricultural areas below the dam.

Page 11-11, lines 27-29:

five facilities: (1) Big Dry Creek Dam and Diversion (30.3 TAF), (2) Alluvial Drain Detention Basin (9.7 TAF), (3) Fancher Creek Dam and Reservoir (0.4 TAF), (4) Pup Creek Detention Basin (0.5 TAF), and (5) Redbank Creek Detention Basin (0.9 TAF).

Page 11-11, lines 38-39:

Project, with a storage capacity of approximately 41 TAF, consists of five dry dams (Bear (7.7 TAF), Burns (6.8 TAF), Owens (3.6 TAF), Mariposa (15.0 TAF), and Castle (7.5 TAF)), located in the foothills east of

Page 11-12, line 15:

and a downstream objective release of 6,000 cfs in the Merced River at Stevinson. Flood control space required for snowmelt runoff may exceed the 350 TAF rain flood control space, if required due to a large snowpack. The conditional snowmelt flood control space may be up to 400 TAF. The

Page 11-12, line 24:

cfs below Dry Creek. During periods of large snowpack, operations to control snowmelt runoff may exceed the 340 TAF rain flood control space. The conditional snowmelt flood control space may be up to 1,000 TAF. The dam was constructed in 1971 jointly by Turlock ID and

Page 11-12, after line 42:

Tulloch Dam and Reservoir. Tulloch Dam was completed in 1958 and is owned and operated by the Oakdale and South San Joaquin Irrigation Districts under USACE direction. The dam is on the Stanislaus River, 30 miles northeast of Modesto. Tulloch Dam is a gravity dam, 200 feet high, that creates Tulloch Reservoir, with 66, 968 AF gross storage capacity. The primary purpose of the reservoir is water storage, and it is operated for water supply and power generation (Tri-Dam Project 2008).

Page 11-13, lines 4-5:

- **Project levees –** Levees constructed by the State in coordination with USACE as part of the San Joaquin River Flood Control Project or Lower San Joaquin River and Tributaries Project

Page 11-13, line 17:

constructed by the State in coordination with USACE, and are part of the San Joaquin River Flood Control Project.

Page 11-13, lines 24-30:

Chowchilla Bypass Bifurcation Structure and the Mariposa Bypass confluence. Canal embankments bordering both sides of the San Joaquin River between the Mendota Dam and approximately two miles upstream of the Sand Slough Control Structure effectively form a set of nonproject levees that have significantly reduced the width of the floodplain, primarily on the east side of the river. The existing channel capacity in this reach is approximately 4,500 cfs, but flows of this magnitude can cause seepage and levee stability problems (RMC 2007). Much of Reach 4B1 upstream from the Mariposa Bypass is not confined by levees of either type. High, sustained flows during the 2006 snowmelt

Page 11-15, line 22:

Lake (USACE 1980~~1955~~):

Page 11-15, line 20:

Agreement for CVP dams and reservoirs, and the ~~Flood Control Manual USACE~~

Report on Reservoir Regulation for Flood Control, Friant Dam and Millerton Lake, San Joaquin River, California (Flood Control Manual) (USACE 1980). The Flood

Page 11-16, lines 23-25:

channel capacity. When Big Dry Creek Dam is diverting flood flows (up to 700 cfs) into Little Dry Creek, Friant Dam outflow is limited to ~~7,300 cfs or less (other local flow would further limit Friant outflows to the river)~~ 8,000 cfs less the release from Big Dry

Creek Dam down Little Dry Creek and any other local flow below Friant Dam above Little Dry Creek. (USACE 1999a).

Page 11-17, Table 11-1:

Table 11-1.
Design Capacities of San Joaquin River and Bypasses Within the Restoration Area

Reach		Upstream Extent	Downstream Extent	Levee Type	Design Capacity (cfs)
San Joaquin River	Reach 1A	Friant Dam	State Route 99	None	8,000
San Joaquin River	Reach 1B	State Route 99	Gravelly Ford	None	8,000
San Joaquin River	Reach 2A	Gravelly Ford	Chowchilla Bypass Bifurcation Structure	Project	8,000
San Joaquin River	Reach 2B	Chowchilla Bypass Bifurcation Structure	Mendota Dam	Nonproject	2,500
San Joaquin River	Reach 3	Mendota Dam	Sack Dam	Nonproject	4,500
San Joaquin River	Reach 4A	Sack Dam	Sand Slough Control Structure	Nonproject	4,500
San Joaquin River	Reach 4B1	Sand Slough Control Structure	Confluence with Mariposa Bypass	Nonproject	1,500
San Joaquin River	Reach 4B2	Confluence with Mariposa Bypass	Confluence with Bear Creek and Eastside Bypass	Project	10,000
San Joaquin River	Reach 5	Confluence with Bear Creek and Eastside Bypass	Confluence with Merced River	Project	26,000
Chowchilla Bypass		Chowchilla Bypass Bifurcation Structure	Confluence with Fresno River and Eastside Bypass	Project	5,500
Eastside Bypass	Reach 1	Fresno River	Sand Slough Bypass	Project	10,000 - 17,000
Eastside Bypass	Reach 2	Sand Slough Bypass	Mariposa Bypass Bifurcation Structure/Eastside Bypass Bifurcation Structure	Project	16,500
Eastside Bypass	Reach 3	Mariposa Bypass Bifurcation Structure/Eastside Bypass Bifurcation Structure	Head of Reach 5	Project	13,500-18,500
Sand Slough Bypass		Sand Slough Control Structure	Eastside Bypass	Project	3,000
Mariposa Bypass		Mariposa Bypass Bifurcation Structure	Confluence with San Joaquin River	Project	8,500
Kings River North		Fresno Slough Bypass	Mendota Pool	Nonproject	4,750

~~Note:~~
~~[1] Summarized from results of one-dimensional HEC-RAS hydraulic modeling described in Appendix H, "Modeling."~~Key:
Source: U.S. Army Corps of Engineers. 1993. San Joaquin River Mainstem, California, Reconnaissance Report, Sacramento District, Sacramento, California.

Key:
cfs = cubic feet per second

Page 11-18, line 38:

Slough Control Structure ~~is used~~was designed to maintain this design discharge. Actual San Joaquin

Page 11-20, line 7:

1980~~1955~~). The regulations set limitations on storage space in Millerton Lake and flow

Page 11-20, line 24:

the Chowchilla and Eastside bypasses~~ (U.S. Congress 1944)~~. The State Legislature

Page 11-20, lines 32-33:

management facilities that are maintained by State and local entities~~ (U.S. Congress 1955)~~.

Page 11-21, line 2:

costs during the period of planning and engineering~~ (U.S. Congress 1986)~~.

Page 11-21, line 7:

~~(U.S. Congress 1990)~~.

Page 11-21, line 11:

~~(U.S. Congress 1999)~~.

Page 11-21, Between lines 31 and 32:

Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act was approved by the Federal Government on March 3, 1899, (33 USC 401 *et seq.*). Under section 10 of the Act, the building of any wharfs, piers, jetties, and other structures, and excavation or fill within navigable waters is prohibited without Congressional approval, and requires the approval of the Chief of Engineers and authorization from the Secretary of the Army.

Page 11-21, lines 32-39:

Section 408 of the Rivers and Harbors Act

Section 14 of the Rivers and Harbors Act (commonly known as Section 408) was approved by the Federal Government on March 3, 1899, (33 USC 408). The act provides that the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the temporary occupation or use of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States~~. This permission is granted by an appropriate real estate instrument in accordance with existing real estate regulations ~~(USACE 1899).

Page 11-23, lines 11-16

Lower San Joaquin Levee District

~~The~~ LSJLD was created in 1955 by a special act of the State Legislature to operate, maintain, and repair levees, bypasses, and other facilities built in connection with the Lower San Joaquin River Flood Control Project. The district encompasses approximately 468 square miles (300,000 acres) in Fresno, Madera, and Merced counties, of which 94 square miles are in Fresno County. LSJLD is responsible for operation and maintenance of the project levees, bifurcation structures, control structures, and bypass channels that route high flows out of the San Joaquin River into the bypass system, moderating flows in Reaches 2B, 3, 4, and 5. Major facilities in the San Joaquin River Flood Control Project include the Chowchilla Bypass Bifurcation Structure, Chowchilla Bypass, Eastside Bypass Control Structure, Eastside Bypass, Mariposa Bypass Structure, and Mariposa Bypass. LSJLD, in accordance with its agreement with the Reclamation Board, is obligated to maintain not only the bypasses, but the channel of the San Joaquin River in the project area, in a condition where the channel will carry specified flood flows in accordance with the maximum benefits for flood protection. LSJLD is funded by property tax assessments on lands within LSJLD boundaries that receive flood control benefits.

Page 11-40, line 3:

Level. Each site-specific study will include an analysis of the potential of the~~that~~ project to

Page 11-43, line 6:

"Description of Alternatives," Interim and Restoration flows would be ~~constrained to~~maintained at or below

Page 11-43, line 17:

flows at or below estimates of then-existing channel capacities; and (3) closely monitoring

Page 11-43, lines 20-36:

Then-existing channel capacities would be estimated as flows that would correspond to a levee slope stability Factor of Safety of 1.4 or greater as calculated using standard USACE criteria for levees under a steady state of saturation for a prolonged time (USACE 2000) and an underseepage Factor of Safety corresponding to an exit gradient at the toe of the levee of 0.5 or less at the landside levee toe as calculated using USACE criteria for levee underseepage (USACE 2005). The application of these criteria requires the collection and evaluation of data at locations throughout the Restoration Area. Until adequate data are available to apply the USACE criteria, Reclamation would limit the release of Interim and Restoration flows to those which would remain in-channel. In-channel flows are flows that maintain a water surface elevation at or below the elevation of the landside levee toe (i.e., the base of the levee). When sufficient data are available to determine the Factors of Safety, Reclamation would limit Interim and Restoration flows to levels that would correspond to a levee slope stability Factor of Safety of 1.4 or higher and an underseepage Factor of Safety corresponding to an exit gradient at the toe of the levee of 0.5 or less at the landside levee toe at all times. Observation of levee erosion, seepage, boils, impaired emergency levee access, or other indications of increased flood risk identified through ongoing monitoring at potential erosion sites would indicate that the minimum Factors of Safety ~~is~~are not met and would trigger immediate response actions to reduce Interim and Restoration flows as described in Chapter 2.0, "Description of Alternatives." Such observations would supersede channel capacity estimates, and Interim and Restoration flows would be reduced in areas where these conditions occur.

Page 11-50, line 4:

inspection and maintenance procedures. The ~~long-term~~ agreement would identify and

4.9 Chapter 12.0, "Hydrology – Groundwater"

Page 12-3, line 6

watershed (DWR 1998~~9~~). The San Joaquin River Hydrologic Region also includes

Page 12-3, line 21

Buena Vista Lake bed (DWR 1998~~9~~). The Tulare Lake Hydrologic Region consists of 12

Page 12-25, lines 9-12:

also reported between 1984 and 1996 along the DMC. Two of the locations where subsidence was reported were near the Mendota Pool, where 1.3 feet of land subsidence were measured, and approximately 25 miles northeast of the Mendota Pool, where 2.0 feet of land subsidence were measured (Central California ID 1996, as cited in Reclamation 1997). Land subsidence

Page 12-25, line 39

boron, chloride, nitrates, arsenic, selenium, dibromochloropropane (DBCP), ~~and~~ radon~~.~~, and uranium.

Page 12-28, line 23:

(SWRCB 1991, as cited in Reclamation 1997). Arsenic concentrations have been reported above the MCL of 10 μg/L in

Page 12-29, between lines 9 and 10

Uranium. Uranium is naturally occurring in the eastern San Joaquin Valley, having been derived from granitic rocks of the Sierra Nevada. Uranium concentrations in groundwater have exceeded Federal and State drinking water standards in the eastern San Joaquin Valley for the last 20 years. Uranium concentrations have been reported above the MCL, with most of the reports of exceedance of the MCL within Modesto, Fresno, and Bakersfield (Jurgens et al. 2009).

Page 12-45, lines 9-10

concern on a regional level include TDS, boron, nitrates, arsenic, selenium, DBCP, ~~and~~ radon, and uranium.

Page 12-46, between lines 35 and 36

Uranium. Uranium is naturally occurring in the eastern San Joaquin Valley, having been derived from granitic rocks of the Sierra Nevada. Uranium concentrations have been reported above the MCL in Bakersfield (Jurgens et al. 2009).

Page 12-52, line 39

and can recharge a guaranteed 140~~,~~.5 TAF per year with a maximum of 400 TAF per year.

Page 12-55, line 19

Luis ~~ID~~WD to offset reductions in contract water supplies attributable to the CVPIA. The

Page 12-68, Table 12-16:

**Table 12-16.
Average Annual Simulated Groundwater Pumping of All Restoration Year Types Used in Schmidt Tool Calculations – Low[1, 2]**

District	Existing Level (2005)[3]				Future Level (2030)[3]			
	Existing Conditions (TAF)	Alt A[4,6] (TAF)	Alt B[4,7] (TAF)	Alt C[4,8] (TAF)	No-Action Alt[4] (TAF)	Alt A[5,6] (TAF)	Alt B[5,7] (TAF)	Alt C[5,8] (TAF)
Arvin-Edison WSD	186	211 (14%)	211 (14%)	211 (13%)	186 (0%)	211 (14%)	211 (14%)	210 (13%)
Chowchilla WD	93	105 (13%)	105 (13%)	104 (12%)	93 (0%)	105 (13%)	105 (13%)	103 (11%)
Delano-Earlimart ID	26	28 (8%)	28 (9%)	27 (2%)	26 (0%)	28 (9%)	29 (10%)	26 (-1%)
Exeter ID	20	21 (6%)	21 (6%)	21 (5%)	20 (0%)	21 (6%)	21 (6%)	21 (5%)
Ivanhoe ID	16	16 (2%)	16 (2%)	16 (2%)	16 (0%)	16 (2%)	16 (3%)	16 (1%)
Lindmore ID	34	35 (2%)	35 (2%)	34 (0%)	34 (0%)	35 (2%)	35 (2%)	34 (0%)
Lindsay-Strathmore ID[9]	7	6 (-15%)	6 (-15%)	6 (-20%)	7 (0%)	6 (-15%)	6 (-14%)	6 (-20%)
Lower Tule River ID	134	152 (14%)	152 (14%)	151 (13%)	134 (0%)	152 (14%)	152 (14%)	151 (13%)
Madera ID	153	166 (8%)	166 (8%)	164 (7%)	153 (0%)	166 (8%)	166 (8%)	164 (7%)
Orange Cove ID[9]	41	39 (-4%)	40 (-4%)	39 (-5%)	41 (0%)	40 (-4%)	40 (-3%)	39 (-5%)
Porterville ID	23	25 (9%)	25 (9%)	25 (7%)	23 (0%)	25 (9%)	25 (9%)	25 (7%)
Saucelito ID	15	17 (13%)	17 (13%)	17 (11%)	15 (0%)	17 (13%)	17 (14%)	17 (10%)
Shafter-Wasco ID	55	56 (3%)	57 (3%)	56 (1%)	55 (0%)	56 (3%)	57 (3%)	55 (1%)
Southern San Joaquin MUD	49	50 (1%)	50 (1%)	48 (-2%)	49 (0%)	50 (1%)	50 (2%)	47 (-3%)
Tulare ID	137	148 (8%)	148 (8%)	148 (8%)	137 (0%)	148 (8%)	148 (8%)	147 (8%)

Input to Schmidt Tool Calculations

Page 12-69, Table 12-16:

Table 12-16.
Average Annual Simulated Groundwater Pumping of All Restoration Year Types Used in Schmidt Tool Calculations – Low[1, 2] (contd.)

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] Low = full quantity of recaptured Interim and Restoration flows is successfully recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively low.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change from existing conditions.
[5] (%) indicates percent change from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003.
[6] Alt A – Low = full return of Interim and Restoration flows by Delta pumping.
[7] Alt B – Low = full return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – Low = full return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
[9] Lindsay-Strathmore Irrigation District and Orange Cove Irrigation District are located at the eastern boundary of the aquifer, at the base of the Sierra foothills. Rapid thinning of the aquifer formation underlying these specific districts occurs moving towards the base of the Sierra foothills. As a result, associated groundwater levels show dramatic responses to changes in groundwater pumping. The Schmidt Tool does not provide the sensitivity to capture the localized responses across the district areas. Within the Schmidt Tool, annual changes in groundwater levels are calculated as a result of changes in groundwater pumping.

Key:
Alt = Alternative
ID = Irrigation District
MUD = Municipal Utilities District
TAF = thousand acre-feet
WD = Water District
WSD = Water Storage District

Page 12-70, Table 12-17:

Table 12-17.
Average Annual Groundwater Depth of All Restoration Year Types Using Schmidt Tool – Low[1,2]

District	Existing Level (2005)[3]				Future Level (2030)[3]			
	Existing Conditions (feet)	Alt A[4,6] (feet)	Alt B[4,7] (feet)	Alt C[4,8] (feet)	No-Action Alt[4] (feet)	Alt A[5,6] (feet)	Alt B[5,7] (feet)	Alt C[5,8] (feet)
Arvin-Edison WSD	410	583 (42%)	583 (42%)	579 (41%)	410 (0%)	583 (42%)	584 (42%)	577 (41%)
Chowchilla WD	245	288 (17%)	288 (18%)	285 (16%)	245 (0%)	288 (17%)	289 (18%)	283 (16%)
Delano-Earlimart ID	193	208 (8%)	208 (8%)	196 (2%)	193 (0%)	208 (8%)	211 (9%)	192 (-1%)
Exeter ID	90	114 (27%)	115 (27%)	111 (23%)	90 (0%)	115 (27%)	115 (28%)	109 (21%)
Ivanhoe ID	108	114 (6%)	114 (6%)	112 (4%)	108 (0%)	114 (6%)	115 (7%)	111 (3%)
Lindmore ID	95	105 (10%)	105 (11%)	97 (2%)	95 (0%)	105 (11%)	107 (12%)	93 (-2%)
Lindsay-Strathmore ID[9]	53	42 (-20%)	42 (-19%)	39 (-26%)	52 (0%)	42 (-19%)	43 (-18%)	39 (-26%)
Lower Tule River ID	238	286 (20%)	286 (20%)	283 (19%)	238 (0%)	286 (20%)	286 (20%)	282 (19%)
Madera ID	246	255 (4%)	255 (4%)	254 (3%)	246 (0%)	255 (4%)	255 (4%)	254 (3%)
Orange Cove ID[9]	33	-46 (-242%)	-45 (-237%)	-71 (-319%)	32 (0%)	-45 (-238%)	-39 (-219%)	-71 (-319%)
Porterville ID	73	115 (59%)	116 (60%)	110 (52%)	73 (0%)	116 (59%)	117 (61%)	108 (49%)
Saucelito ID	208	242 (17%)	242 (17%)	236 (14%)	208 (0%)	242 (17%)	243 (17%)	234 (13%)
Shafter-Wasco ID	403	416 (3%)	417 (4%)	409 (2%)	403 (0%)	417 (4%)	418 (4%)	406 (1%)
Southern San Joaquin MUD	243	243 (0%)	243 (0%)	242 (0%)	243 (0%)	243 (0%)	243 (0%)	241 (0%)
Tulare ID	223	284 (27%)	284 (28%)	281 (26%)	223 (0%)	284 (27%)	284 (28%)	280 (26%)

Source: Schmidt Tool Calculations

Page 12-71, Table 12-17:

Table 12-17.
Average Annual Groundwater Depth of All Restoration Year Types Using Schmidt Tool – Low[1,2] (contd.)

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] Low = full quantity of recaptured Interim and Restoration flows is successfully recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively low, and corresponding change in groundwater depth would be small.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change from existing conditions.
[5] (%) indicates percent change from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003.
[6] Alt A – Low = full return of Interim and Restoration flows by Delta pumping.
[7] Alt B – Low = full return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – Low = full return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
[9] Lindsay-Strathmore Irrigation District and Orange Cove Irrigation District are located at the eastern boundary of the aquifer, at the base of the Sierra foothills. Rapid thinning of the aquifer formation underlying these specific districts occurs moving towards the base of the Sierra foothills. As a result, associated groundwater levels show dramatic responses to changes in groundwater pumping. The Schmidt Tool does not provide the sensitivity to capture the localized responses across the district areas. Within the Schmidt Tool, annual changes in groundwater levels are calculated as a result of changes in groundwater pumping.

Key:
Alt = Alternative
ID = Irrigation District
MUD = Municipal Utilities District
TAF = thousand acre-feet
WD = Water District
WSD = Water Storage District

Page 12-72, Table 12-18:

Table 12-18.
Average Annual Simulated Groundwater Pumping of All Restoration Year Types Used in Schmidt Tool Calculations – High[1,2]

District	Existing Level (2005)[3]				Future Level (2030)[3]			
	Existing Conditions (TAF)	Alt A[4,6] (TAF)	Alt B[4,7] (TAF)	Alt C[4,8] (TAF)	No-Action Alt[4] (TAF)	Alt A[5,6] (TAF)	Alt B[5,7] (TAF)	Alt C[5,8] (TAF)
Arvin-Edison WSD	186	214 (15%)	214 (15%)	213 (15%)	186 (0%)	214 (15%)	214 (15%)	213 (14%)
Chowchilla WD	93	109 (17%)	108 (16%)	107 (15%)	93 (0%)	109 (17%)	108 (16%)	107 (15%)
Delano-Earlimart ID	26	36 (39%)	35 (36%)	33 (29%)	26 (0%)	36 (39%)	35 (35%)	32 (24%)
Exeter ID	20	22 (10%)	22 (10%)	22 (9%)	20 (0%)	22 (10%)	22 (10%)	22 (8%)
Ivanhoe ID	16	17 (6%)	17 (6%)	17 (5%)	16 (0%)	17 (6%)	17 (5%)	17 (4%)
Lindmore ID	34	37 (9%)	37 (8%)	36 (6%)	34 (0%)	37 (9%)	37 (8%)	36 (5%)
Lindsay-Strathmore ID[9]	7	8 (14%)	8 (11%)	7 (4%)	7 (0%)	8 (14%)	8 (10%)	7 (-1%)
Lower Tule River ID	134	157 (17%)	156 (17%)	155 (16%)	134 (0%)	157 (17%)	156 (16%)	154 (15%)
Madera ID	153	172 (12%)	171 (12%)	170 (11%)	153 (0%)	172 (12%)	171 (12%)	169 (10%)
Orange Cove ID[9]	41	42 (3%)	42 (3%)	41 (1%)	41 (0%)	42 (3%)	42 (2%)	41 (0%)
Porterville ID	23	26 (14%)	26 (13%)	26 (12%)	23 (0%)	26 (14%)	26 (13%)	26 (11%)
Saucelito ID	15	19 (24%)	18 (23%)	18 (20%)	15 (0%)	19 (24%)	18 (22%)	18 (19%)
Shafter-Wasco ID	55	60 (9%)	60 (9%)	59 (7%)	55 (0%)	60 (9%)	60 (8%)	58 (6%)
Southern San Joaquin MUD	49	57 (16%)	56 (14%)	54 (11%)	49 (0%)	57 (16%)	56 (14%)	53 (8%)
Tulare ID	137	150 (10%)	150 (9%)	149 (9%)	137 (0%)	150 (10%)	150 (9%)	149 (9%)

Source: Input to Schmidt Tool Calculations

Page 12-73, Table 12-18:

Table 12-18.
Average Annual Simulated Groundwater Pumping of All Restoration Year Types Used in Schmidt Tool Calculations – High[1,2] (contd.)

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively high.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change from existing conditions.
[5] (%) indicates percent change from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
[9] Within the Schmidt Tool, annual changes in groundwater levels are calculated as a result of changes in groundwater pumping. Because the regional resolution of the model is not fully reflective of the unique groundwater conditions within Lindsay-Strathmore Irrigation District ID and Orange Cove ID, small increases to surface water supply deliveries within the Schmidt Tool results in small decreases in groundwater pumping in those districts and create large increases in groundwater levels. This output should not be construed as a precise forecast of conditions that would occur at the district level.

Key:
Alt = Alternative
ID = Irrigation District
MUD = Municipal Utilities District
TAF = thousand acre-feet
WD = Water District
WSD = Water Storage District

Page 12-74, Table 12-19:

Table 12-19.
Average Annual Groundwater Depth of All Restoration Year Types Using Schmidt Tool – High[1,2]

District	Existing Level (2005)[3]				Future Level (2030)[3]			
	Existing Conditions (feet)	Alt A[4,6] (feet)	Alt B[4,7] (feet)	Alt C[4,8] (feet)	No-Action Alt[4] (feet)	Alt A[5,6] (feet)	Alt B[5,7] (feet)	Alt C[5,8] (feet)
Arvin-Edison WSD	410	603 (47%)	601 (47%)	596 (45%)	410 (0%)	603 (47%)	600 (46%)	593 (45%)
Chowchilla WD	245	303 (24%)	301 (23%)	297 (21%)	245 (0%)	303 (24%)	301 (23%)	295 (20%)
Delano-Earlimart ID	193	264 (37%)	258 (34%)	244 (27%)	193 (0%)	264 (37%)	256 (33%)	236 (22%)
Exeter ID	90	132 (46%)	130 (44%)	126 (40%)	90 (0%)	132 (46%)	129 (44%)	123 (37%)
Ivanhoe ID	108	124 (15%)	123 (15%)	121 (12%)	108 (0%)	124 (15%)	123 (14%)	119 (11%)
Lindmore ID	95	144 (51%)	140 (47%)	130 (37%)	95 (0%)	144 (51%)	139 (46%)	124 (31%)
Lindsay-Strathmore ID[9]	53	62 (18%)	60 (14%)	55 (5%)	52 (0%)	62 (18%)	59 (13%)	52 (-1%)
Lower Tule River ID	238	298 (25%)	296 (25%)	293 (24%)	238 (0%)	298 (25%)	296 (25%)	292 (23%)
Madera ID	246	259 (6%)	259 (5%)	258 (5%)	246 (0%)	259 (6%)	259 (5%)	257 (5%)
Orange Cove ID[9]	33	103 (217%)	88 (172%)	51 (57%)	32 (0%)	103 (217%)	83 (156%)	29 (-12%)
Porterville ID	73	141 (95%)	139 (91%)	132 (82%)	73 (0%)	141 (94%)	138 (90%)	128 (77%)
Saucelito ID	208	269 (30%)	266 (28%)	259 (25%)	208 (0%)	269 (30%)	265 (28%)	255 (23%)
Shafter-Wasco ID	403	451 (12%)	448 (11%)	439 (9%)	403 (0%)	451 (12%)	447 (11%)	434 (8%)
Southern San Joaquin MUD	243	248 (2%)	248 (2%)	246 (2%)	243 (0%)	248 (2%)	248 (2%)	246 (1%)
Tulare ID	223	296 (33%)	295 (32%)	292 (31%)	223 (0%)	296 (33%)	294 (32%)	290 (30%)

Source: Schmidt Tool Calculations

Page 12-75, Table 12-19:

Table 12-19.
Average Annual Groundwater Depth of All Restoration Year Types Using Schmidt Tool – High[1,2] (contd.)

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively high, and corresponding change in groundwater depth would be large.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change from existing conditions.
[5] (%) indicates percent change from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
[9] Within the Schmidt Tool, annual changes in groundwater levels are calculated as a result of changes in groundwater pumping. Because the regional resolution of the model is not fully reflective of the unique groundwater conditions within Lindsay-Strathmore Irrigation District ID and Orange Cove ID, small increases to surface water supply deliveries within the Schmidt Tool results in small decreases in groundwater pumping in those districts and create large increases in groundwater levels. This output should not be construed as a precise forecast of conditions that would occur at the district level.

Key:
Alt = Alternative
ID = Irrigation District
MUD = Municipal Utilities District
TAF = thousand acre-feet
WD = Water District
WSD = Water Storage District

Page 12-92, Table 12-20:

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
~~[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to reoperating Friant Dam would be relatively high, and corresponding change in groundwater depth would be large.~~ [2] Low = full quantity of recaptured Interim and Restoration flows is successfully recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively low, and corresponding change in groundwater depth would be small.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change in surface water deliveries from existing conditions. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[5] (%) indicates percent change in surface water deliveries from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
Key:
Alt = Alternative
ID = Irrigation District
TAF = thousand acre-feet
WD = Water District

Page 12-94, Table 12-21:

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
~~[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to reoperating Friant Dam would be relatively high, and corresponding change in groundwater depth would be large. .~~ [2] Low = full quantity of recaptured Interim and Restoration flows is successfully recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively low, and corresponding change in groundwater depth would be small.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change from existing conditions.
[5] (%) indicates percent change from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
Key:
Alt = Alternative
ID = Irrigation District
TAF = thousand acre-feet
WD = Water District

Page 12-96, Table 12-22:

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively high, and corresponding change in groundwater depth would be large.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change in surface water deliveries from existing conditions. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[5] (%) indicates percent change in surface water deliveries from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
Key:
Alt = Alternative
ID = Irrigation District
TAF = thousand acre-feet
WD = Water District

Page 12-98, Table 12-23:

Notes:
All results are rounded to the nearest whole number.
[1] Year type as defined by the Restoration Year Type.
[2] High = no water released as Interim and Restoration flows is recirculated to Friant Division long-term contractors. The increase in groundwater pumping due to ~~re~~operating Friant Dam would be relatively high, and corresponding change in groundwater depth would be large.
[3] Simulation period: October 1921 – September 2003.
[4] (%) indicates percent change in surface water deliveries from existing conditions. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[5] (%) indicates percent change in surface water deliveries from No-Action Alternative. CalSim II simulation period: October 1921 – September 2003. Reductions in surface water deliveries are assumed to be supplemented with groundwater pumping.
[6] Alt A – High = no return of Interim and Restoration flows by Delta pumping.
[7] Alt B – High = no return of Interim and Restoration flows by Delta pumping and full return of San Joaquin River exchange flows.
[8] Alt C – High = no return of Interim and Restoration flows by Delta pumping, full return of San Joaquin River exchange flows, and full return of San Joaquin River pumping.
Key:
Alt = Alternative
ID = Irrigation District
TAF = thousand acre-feet
WD = Water District

Page 12-121, between lines 13 and 14

The potential for an accelerated state of overdraft under the action alternatives could lead to private well owners abandoning or deepening groundwater wells sooner than would be necessary under the No-Action Alternative if groundwater levels are drawn below existing well screens. Costs for deepening groundwater wells, lowering pumps in the wells, constructing new groundwater wells, or abandoning wells would be the responsibility of private well owners. The potential cost implications of deepening groundwater wells, lowering pumps, constructing new wells, or abandoning wells is discussed in Chapter 22.0, "Socioeconomics." If groundwater wells are abandoned, it would be the responsibility of private well owners to decommission the wells properly in accordance with standards developed by DWR pursuant to Section 13800 of the California Water Code and adopted by SWRCB or local agencies in accordance with Section 13801 of the California Water Code.

4.10 Chapter 13.0, "Hydrology – Surface Water Supplies and Facilities"

Page 13-2, line 5:

space in Millerton Lake is maintained for rain flood management (USACE 1980~~1955~~). Under

Page 13-14, Table 13-9:

Source: CDEC 2008, USGS 2008, Reclamation 2008c~~7~~

Pages 13-15, Figure 13-8:

Source: Reclamation 2008c~~7~~, Gage ID not available

Page 13-17, Table 13-11:

Source: Reclamation 2008c~~7~~, Gage Station No. not available

Page 13-18, lines 6-7:

releases. Flood flows in the San Joaquin and/or Kings rivers occurred most recently at the Mendota Pool in 1997, 2001, 2005, ~~and~~ 2006, and 2011. At all other times, the DMC is the primary source of

Page 13-18, lines 26-28:

relative to Reach 1. ~~Gravelly Ford~~ Reach 2A has high percolation losses, and flow at Gravelly Ford is less than 50 cfs approximately 50 percent of the time (see Appendix J, "Surface Water Supplies and Facilities Operations"). Under steady-state conditions (i.e., losses are calculated under

Page 13-44, lines 21-23:

to prescribed limits. Though VAMP was ~~flows were~~ discontinued in 2011~~0~~, ~~the recent NMFS 2009 BOs included continuation of VAMP-like flows in the reasonable and prudent alternatives~~ the No-Action Alternative includes a continuation of a VAMP-like condition. SWRCB indicates that VAMP experimental data will be used to create permanent objectives for the pulse flow period. It is assumed for purposes of this analysis that new SWRCB objectives will maintain the same level of protection for fisheries as the current program or increase the level of protection, and that such protections will remain in place through 2030. Because considerable uncertainty remains as to the flows that will occur under future flow requirements in the San Joaquin River, the analyses include the continuation of VAMP as a surrogate for these requirements.

Page 13-49, line 20:

for the anadromous fishery downstream from the project (~~FERC 2009~~DFG et al. 1995).

Page 13-56, lines 27-28:

Division contract amounts for each contractor. Figure 13-30 shows the historical declared allocation of water to Friant Division contractors. Actual historical delivery of Class 2 water supplies may be less than but do not exceed declared allocations. As shown, annual allocation of Class 1

Page 13-57, Figure 13-30:

Note: Actual historical delivery of Class 2 water supplies may be less than but do not exceed declared allocations shown in figure.

Page 13-67, line 12:

is reasonable,~~y~~ prudent, and feasible to be presented to Congress to address fish, wildlife,

Page 13-67, line 33:

Water Authority, Westlands WD~~-~~, and MWD of Southern California. The San Joaquin River Agreement expired in 2011.

Page 13-92, Table 13-63:

Table 13-63.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Wet Years[1]

Begin Date	End Date	Friant Dam Releases According to Settlement[2] (cfs)	Reach 1 Holding Contract Diversions Estimated as in Exhibit B[3] (cfs)	Friant Dam Releases Eligible for Recapture[3] (cfs)
March 1	March 15	500	130	370
March 16	March 31	1,500	130	1,370
April 1	April 15	2,500	150	2,350
April 16	April 30	4,000	150	3,850
May 1	June 30	2,000	190	1,810
July 1	August 31	350	230	120
September 1	September 30	350	210	140
October 1	October 31	350	160	190
November 1	November 10	700	130	570
November 11	December 31	350	120	230
January 1	February 28	350	100	250
Total Flows Released (TAF)		**673**	**Total Available for Transfer[4] (TAF)**	**556**
Potential Buffer Flows (TAF)		**67**	**Potential Buffer Flows (TAF)**	**67**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**60**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**800**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**623**

Notes:
[1] Wet years as defined by the Restoration Year Type.
[2] Nonflood conditions.
[3] Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under "holding contracts." The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
[4] Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
[5] Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.
Key:
cfs = cubic feet per second
TAF = thousand acre-feet

Page 13-93, Table 13-64:

Table 13-64.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Normal-Wet Years[1]

Begin Date	End Date	Maximum Releases from Friant Dam[2] (cfs)	Reach 1 Holding Contract Releases[3] (cfs)	Friant Release Minus Holding Contract Releases[3] (cfs)
March 1	March 15	500	130	370
March 16	March 31	1,500	130	1,370
April 1	April 15	2,500	150	2,350
April 16	April 30	4,000	150	3,850
May 1	June 30	350	190	160
July 1	August 31	350	230	120
September 1	September 30	350	210	140
October 1	October 31	350	160	190
November 1	November 10	700	130	570
November 11	December 31	350	120	230
January 1	February 28	350	100	250
Total Flows Released (TAF)		**473**	**Total Available for Transfer4 (TAF)**	**356**
Potential Buffer Flows (TAF)		**47**	**Potential Buffer Flows (TAF)**	**47**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**60**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**580**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**403**

Notes:
[1] Normal-Wet years as defined by the Restoration Year-Type.
[2] Nonflood conditions.
[3] Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under “holding contracts.” The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
[4] Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
[5] Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.
Key:
cfs = cubic feet per second
TAF = thousand acre-feet

Page 13-94, Table 13-65:

Table 13-65.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Normal-Dry Years[1]

Begin Date	End Date	Maximum Releases from Friant Dam[2] (cfs)	Reach 1 Holding Contract Releases[3] (cfs)	Friant Release Minus Holding Contract Releases[3] (cfs)
March 1	March 15	500	130	370
March 16	March 31	1,500	130	1,370
April 1	April 15	2,500	150	2,350
April 16	April 30	350	150	200
May 1	June 30	350	190	160
July 1	August 31	350	230	120
September 1	September 30	350	210	140
October 1	October 31	350	160	190
November 1	November 10	700	130	570
November 11	December 31	350	120	230
January 1	February 28	350	100	250
Total Flows Released (TAF)		**365**	**Total Available for Transfer[4] (TAF)**	**248**
Potential Buffer Flows (TAF)		**36**	**Potential Buffer Flows (TAF)**	**36**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**60**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**461**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**284**

Notes:
1 Normal-Dry years as defined by the Restoration Year Type.
2 Nonflood conditions.
3 Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under "holding contracts." The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
4 Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
5 Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.

Key:
cfs = cubic feet per second
TAF = thousand acre-feet

Page 13-95, Table 13-66:

Table 13-66.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Dry Years[1]

Begin Date	End Date	Maximum Releases from Friant Dam[2] (cfs)	Reach 1 Holding Contract Releases[3] (cfs)	Friant Release Minus Holding Contract Releases[3] (cfs)
March 1	March 15	500	130	370
March 16	March 31	1,500	130	1,370
April 1	April 15	350	150	200
April 16	April 30	350	150	200
May 1	June 30	350	190	160
July 1	August 31	350	230	120
September 1	September 30	350	210	140
October 1	October 31	350	160	190
November 1	November 10	700	130	570
November 11	December 31	350	120	230
January 1	February 28	350	100	250
Total Flows Released (TAF)		**301**	**Total Available for Transfer[4] (TAF)**	**184**
Potential Buffer Flows (TAF)		**30**	**Potential Buffer Flows (TAF)**	**30**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**60**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**391**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**214**

Notes:
[1] Dry years as defined by the Restoration Year Type.
[2] Nonflood conditions.
[3] Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under "holding contracts." The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
[4] Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
[5] Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.

Key:
cfs = cubic feet per second
TAF = thousand acre-feet

Page 13-96, Table 13-67:

Table 13-67.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Critical-High Years[1]

Begin Date	End Date	Maximum Releases from Friant Dam[2] (cfs)	Reach 1 Holding Contract Releases[3] (cfs)	Friant Release Minus Holding Contract Releases[3] (cfs)
March 1	March 15	500	130	370
March 16	March 31	1,500	130	1,370
April 1	April 15	200	150	50
April 16	April 30	200	150	50
May 1	June 30	215	190	25
July 1	August 31	255	230	25
September 1	September 30	260	210	50
October 1	October 31	160	160	0
November 1	November 10	400	130	270
November 11	December 31	120	120	0
January 1	February 28	110	100	10
Total Flows Released (TAF)		**187**	**Total Available for Transfer[4] (TAF)**	**71**
Potential Buffer Flows (TAF)		**19**	**Potential Buffer Flows (TAF)**	**19**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**60**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**266**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**90**

Notes:
[1] Critical-High years as defined by the Restoration Year Type.
[2] Nonflood conditions.
[3] Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under "holding contracts." The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
[4] Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
[5] Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.

Key:
cfs = cubic feet per second
TAF = thousand acre-feet

Page 13-97, Table 13-68:

Table 13-68.
Maximum Nonflood Friant Dam Releases to San Joaquin River and Maximum Potential Water Recapture in Critical-Low Years[1]

Begin Date	End Date	Maximum Releases from Friant Dam[2] (cfs)	Reach 1 Holding Contract Releases[3] (cfs)	Friant Release Minus Holding Contract Releases[3] (cfs)
March 1	March 15	130	130	0
March 16	March 31	130	130	0
April 1	April 15	150	150	0
April 16	April 30	150	150	0
May 1	June 30	190	190	0
July 1	August 31	230	230	0
September 1	September 30	210	210	0
October 1	October 31	160	160	0
November 1	November 10	130	130	0
November 11	December 31	120	120	0
January 1	February 28	100	100	0
Total Flows Released (TAF)		**117**	**Total Available for Transfer[4] (TAF)**	**0**
Potential Buffer Flows (TAF)		**0**	**Potential Buffer Flows (TAF)**	**0**
Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c) (TAF)		**0**	**Potential ~~a~~Additional ~~r~~Releases ~~p~~Pursuant to ~~p~~Paragraph 13(c), ~~m~~Minus ~~s~~Seepage[5] (TAF)**	**0**
Maximum ~~t~~Total ~~v~~Volume ~~r~~Released (TAF)		**117**	**Maximum ~~t~~Total ~~v~~Volume ~~a~~Available for ~~t~~Transfer (TAF)**	**0**

Notes:
1 Critical-Low years as defined by the Restoration Year Type.
2 Nonflood conditions.
3 Under existing conditions, Reclamation makes deliveries to riparian water right holders in Reach 1 under "holding contracts." The amounts in the table are approximate based on recent historical deliveries (water years 1922 through 2004), as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.
4 Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.
5 Paragraph 13(c) requires the acquisition of purchased water to overcome seepage losses not anticipated in Exhibit B. Because these potential releases would only be made to overcome seepage, this water would not be available for transfer.
Key:
cfs = cubic feet per second
TAF = thousand acre-feet

4.11 Chapter 14.0, "Hydrology – Surface Water Quality"

Page 14-2, line 29:

within Reach 5 demonstrate the effect of irrigation runoff contributions from ~~east~~ west side

Page 14-24, line 4:

salinity in ~~Millerton Lake,~~ the San Joaquin River, the Delta, and CVP/SWP service areas,

4.12 Chapter 16.0, "Land Use and Agricultural Resources"

Page 16-1, lines 28-35:

As described in the *San Joaquin River Restoration Study Background Report* (~~FWUA and NRDC~~McBain and Trush 2002), land ownership data were compiled from Reclamation's database ~~(2001)~~. Data depicting lands managed by the San Joaquin River Parkway and Conservation Tract (SJRPCT) were provided by GreenInfo Network (2002, as cited in McBain and Trush 2002). Data provided by the SJRPCT also were reviewed. As a historic navigable river, the bed of the San Joaquin River is subject to the jurisdiction of the California State Lands Commission. California holds the fee ownership in the river bed between the two ordinary low water marks in Reach 1A (State Lands Commission 1992, as cited in McBain and Trush 2002). Data from the 1989 to 1992 State

Page 16-2, lines 7-8:

Trust Easement. A lease is required for projects on State-owned lands under the jurisdiction of the California State Lands Commission with the exception of lands held under Spanish or Mexican land grants or where a private party acquires a right to use former trust property free of trust restrictions.

Page 16-24, lines 4-5:

State statute in 1990, adopted the ~~San Joaquin River Parkway Task Force (SJRC 1992) in 1992. The~~ *Recompiled San Joaquin River Parkway Master Plan* (SJRC 2000) ~~was adopted~~ on July 20, 2000.

Pages 16-27 and 16-28, Table 16-9:

Table 16-9.
Summary of Environmental Consequences and Mitigation Measures – Land Use Planning and Agricultural Resources

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use Planning and Agricultural Resources: Program-Level				
LUP-1: Conversion of Important Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	No-Action	SU	--	SU
	A1	~~Significant~~PS	LUP-1a: Design and Implement Levee Setbacks to Preserve Agricultural Productivity of Important Farmland to the Extent Possible and Comply with the Surface Mining and Reclamation Act LUP-1b: Minimize Impacts on Williamson Act–Contracted Lands, Comply with Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators	SU
	A2	~~Significant~~PS		SU
	B1	~~Significant~~PS		SU
	B2	~~Significant~~PS		SU
	C1	~~Significant~~PS		SU
	C2	~~Significant~~PS		SU

Table 16-9.
Summary of Environmental Consequences and Mitigation Measures – Land Use Planning and Agricultural Resources (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use Planning and Agricultural Resources: Program-Level (contd.)				
LUP-2: Conversion of Riparian Forest to Non-Forest Uses	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
LUP-3: Conflict with Adopted Land Use Plans, Goals, Policies, and Ordinances of Affected Jurisdictions	No-Action	No Impact	--	No Impact
	A1	SU	--	SU
	A2	SU	--	SU
	B1	SU	--	SU
	B2	SU	--	SU
	C1	SU	--	SU
	C2	SU	--	SU
Land Use Planning and Agricultural Resources: Project-Level				
LUP-4: Physically Divide or Disrupt an Established Community	No-Action	No Impact	--	No Impact
	A1	PS	LUP-4: Implement Vehicular Traffic Detour Planning	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
LUP-5: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Inundation and/or Soil Saturation	No-Action	No Impact	LUP-5: Preserve Agricultural Productivity of Important Farmland to Minimize Effects of Inundation and Saturation Effects	No Impact
	A1	PS		PSU
	A2	PS		PSU
	B1	PS		PSU
	B2	PS		PSU
	C1	PS		PSU
	C2	PS		PSU

Table 16-9.
Summary of Environmental Consequences and Mitigation Measures – Land Use Planning and Agricultural Resources (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Land Use Planning and Agricultural Resources: Project-Level (~~continued~~contd.)				
LUP-6: Diminishment of Agricultural Production by Increased Orchard and Vineyard Diseases	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
LUP-7: Potential Conversion of Riparian Forest Because of Altered Inundation	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
LUP-8: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Water Deliveries	No-Action	No Impact	--	No Impact
	A1	SU	--	SU
	A2	SU	--	SU
	B1	SU	--	SU
	B2	SU	--	SU
	C1	SU	--	SU
	C2	SU	--	SU

Key:
-- = not applicable
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable
SU = significant and unavoidable

Page 16-34, lines 1 through 4:

- Limit temporary and long-term impacts to Important Farmland associated with levee setbacks through coordination with affected landowners.

- When selecting sites for borrow excavation, minimize impacts to Important Farmland by avoiding such lands to the extent possible and minimize the fragmentation of lands that are to remain in agricultural use. Retain contiguous parcels of agricultural land of sufficient size to support their efficient use for continued agricultural production.

Page 16-32, line 27:

agricultural productivity. This impact would be **potentially significant**.

Page 16-34, lines 19 through 35:

- The project proponent will either (1) acquire agricultural conservation easements at a 1:1 ratio (i.e., 1 acre on which easements are acquired to 1 acre of Important Farmland removed from agricultural use) in coordination with affected land owners to maximize the potential for affected landowners to continue to use such lands to the extent possible, to be held by land trusts or public agencies who will be responsible for enforcement of the deed restrictions maintaining these lands in agricultural use, or (2) provide funds to a land trust or government program that conserves agricultural land sufficient to obtain easements on comparable land at a 1:1 ratio.

- Stockpile the upper 2 feet of soil from borrow sites and from portions of levee, bypass, and other project feature footprints that are Important Farmland. Stockpiled soil would be used in subsequent restoration of agricultural uses or redistributed for agricultural purposes in coordination with affected landowners.

- Restore for agricultural uses those portions of borrow sites and of levee, bypass, and other project feature footprints that are Important Farmland and are not converted to project features, managed habitat, or project mitigation for nonagricultural impacts, in coordination with affected landowners. Restoration for agricultural use would include redistribution of salvaged topsoil and earthwork for necessary irrigation and drainage.

Page 16-35, lines 3-4:

- Minimize disturbance of Important Farmland and continuing agricultural operations during construction by implementing the following measures in coordination with affected landowners:

Page 16-40, lines 24-35:

Impact LUP-4 (Alternatives A1 through C2): ***Physically Divide or Disrupt an Established Community – Project-Level.*** An increase in inundated areas as a result of Interim and Restoration flows could physically divide or disrupt an established community. Intermittent local road and bridge closures ~~and detours~~ would disrupt access for residents and business operators; therefore, this impact would be **potentially significant**.

An increase in inundated areas as a result of Interim and Restoration flows could physically divide or disrupt an established community by causing the closure of local roads and vehicle bridges. Many of these roadways and bridges provide the only access to residences and businesses. Intermittent road closures ~~and detours~~ would disrupt such access for residents and business operators; therefore, this impact would be potentially significant.

Page 16-41, lines 34-36:

The action alternatives include a Physical Monitoring and Management Plan (Appendix D) that includes a seepage ~~monitoring and~~ management plan. This seepage management plan ~~that~~ would avoid or reduce inundation and soil saturation effects to agricultural land resulting from implementation of the Settlement. Reclamation continues to work with water districts and participating landowners as part of the Seepage and Conveyance Technical Feedback Group to address potential seepage-related impacts in the short and long term. As described in

Page 16-42, lines 11-19:

- During Interim Flows, Reclamation will determine the acreage of Important Farmland that after implementation of the Physical Monitoring and Management Plan would still be affected by inundation and/or soil saturation resulting from Interim or Restoration flows to an extent sufficient to convert Important Farmland to nonagricultural use. This would result in this land no longer being classified as Important Farmland. This acreage of Important Farmland may be identified through flow, groundwater, and seepage monitoring and modeling included in the action alternatives, ~~or~~ through alternative or additional monitoring or modeling, as necessary, and through consideration of feedback provided by landowners through the Seepage and Conveyance Technical Feedback Workgroup or similar mechanism.

Page 16-44, lines 23-32:

Impact LUP-8 (Alternatives A1 through C2): ***Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Water Deliveries – Project-Level***. The amount of Interim and Restoration flows would change with water-year type, and the amount of Interim and Restoration flows released and recaptured would change over time as program-level actions are implemented. On average, however, water deliveries to Friant Division long-term contractors would be reduced, which would result in ~~a shortfall of surface water supplies during some dry years and, thus, would result in~~ additional groundwater pumping, changes in agricultural practices (e.g., crop selection), and idling of cropland. This impact would be **significant and unavoidable**.

4.13 Chapter 18.0, "Paleontological Resources"

Page 18-2, line 21:
Geologic mapping by Wagner et al. (1991) ~~and Matthews and Burnett (1966)~~ indicates

Page 18-11, line 25:
Mitigation Measure PAL-1 would be implemented by the project proponent during

4.14 Chapter 19.0, "Power and Energy"

Page 19-14, line 6:

Control, Friant Dam and Millerton Lake, San Joaquin River, California (USACE 1980~~1955~~).

4.15 Chapter 21.0, "Recreation"

Page 21-5 after line 36:

Two initiatives are underway by Federal and State agencies that include proposals to expand recreation access and opportunities along the San Joaquin River. These initiatives would complement SJRRP. America's Great Outdoors is a Federal initiative led by the U.S. Department of the Interior to develop a 21st-century conservation and recreation agenda. The America's Great Outdoors initiative has identified projects in all 50 states in which the Federal government could partner with states or local communities to advance the goals of the America's Great Outdoors initiative with existing resources through technical support and with its administrative authorities. One such project is the San Joaquin River Blueway, proposed by the San Joaquin River Partnership, a collaboration of 13 non-profit organizations (U.S. Department of the Interior 2011). The vision for the San Joaquin River Blueway is to create a corridor of recreational access and important landscapes, with a system of recreational and natural areas linked by the river. The San Joaquin River Blueway would provide access and opportunities for boating, fishing, swimming, hiking, biking, wildlife-watching, picnicking, and hunting. The San Joaquin River Partnership also envisions a San Joaquin River Water Trail as an early component of the San Joaquin River Blueway linking existing river access points, and providing enhanced recreational access in the long term and becoming a backbone of the San Joaquin River Blueway (SJRP 2011). The Central Valley Vision, an initiative of California State Parks, proposes two new State parks on the San Joaquin River. One park would be within the existing San Joaquin River Parkway in Reach 1A on about 1,250 acres of existing public land and would provide picnic sites, trails, and boating facilities. The second park would be at Dos Rios, at the confluence of the San Joaquin and Tuolumne Rivers. The 1600-acre park would provide camping, picnicking, boating, and hiking facilities. The implementation plan for the Central Valley Vision also proposes a San Joaquin River Trail linking existing parks and boat landings and a new California State Parks unit focused on addressing recreation and natural resource protection opportunities associated with the restoration program (State Parks 2008b).

Page 21-7, Figure 21-4 is replaced with the following figure:

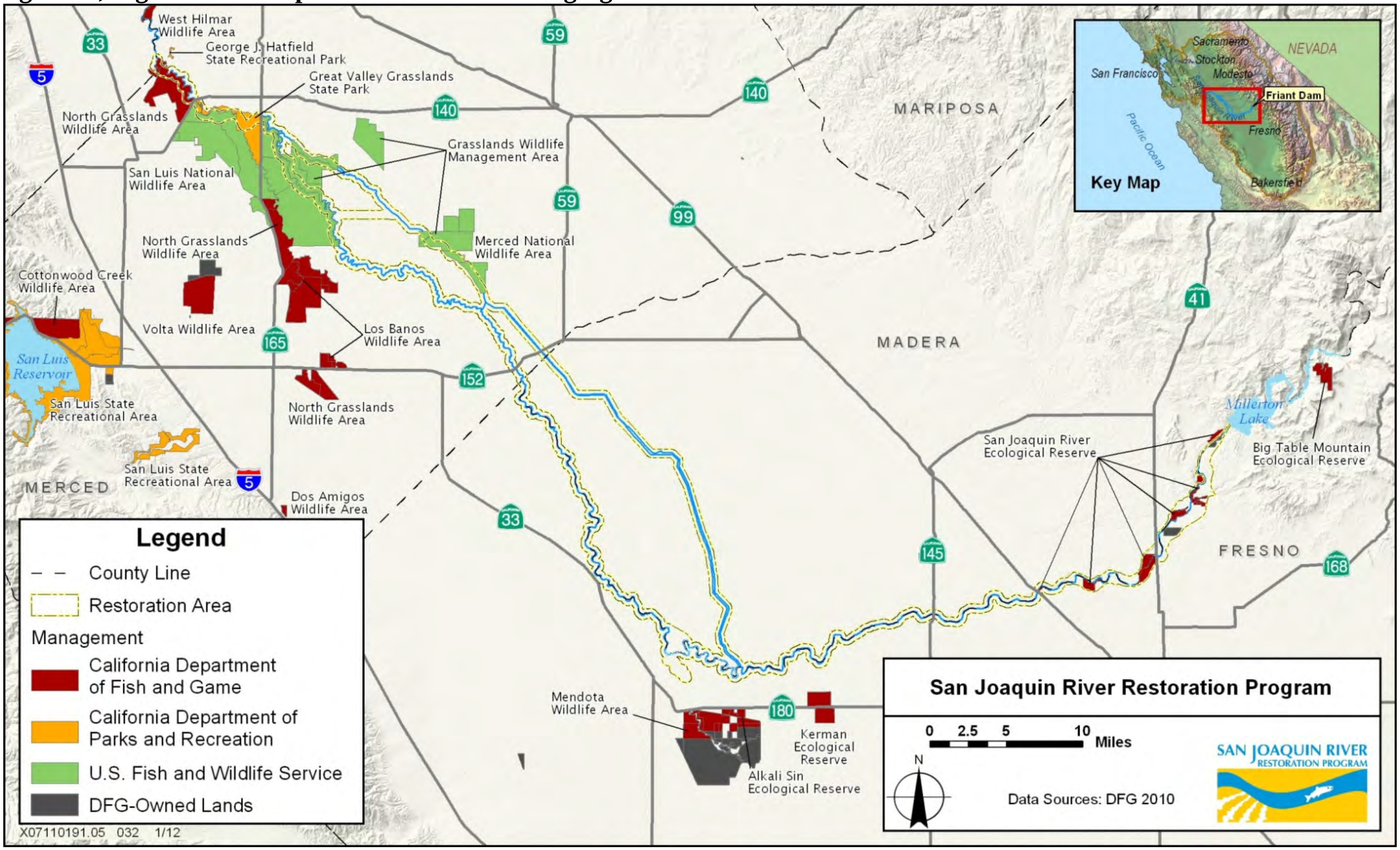


Figure 21-4.
Land Preserves in the Vicinity of the Restoration Area

Page 21-10, lines 12-23:

Interpretation and Education. Most of the interpretation and education activities and facilities occur in Reaches 1 and 4. Activities such as field trips, guided hikes, workshops, storytelling, canoe tours, and other programs are available. Guided canoe trips are offered by the SJRPCT ~~and by the San Joaquin River Watershed Institute~~ (SJRPCT 2010a, SJRPCT 2010b). Several camps are provided by the SJRPCT at Scout Island, and offer environmental education, water activities, arts and crafts, canoeing, and theater presentations (SJRPCT 2009~~8~~). ~~The San Joaquin Watershed Institute also offers environmental education activities and programs at Scout Island, including basic and guided canoeing (SJRPCT 2010b).~~ The Coke Hallowell Center for River Studies provides exhibits, programs, activities, gardens, a restored 1890s ranch house, an orchard, and a vineyard. Additionally, the San Luis NWR in Reach 4 offers two auto tours with interpretive stops, one of which skirts the river.

Page 21-11, line 7:

observing sandhill cranes in the San Luis NWR. San Luis NWR and many of the parks along the river within the Restoration Area provide excellent opportunities to observe breeding, wintering, and migrating birds.

Page 21-16, lines 7-9:

Fresno County. The same survey indicated that Lost Lake Park, at the upper end of the parkway, received about 30,000 visits, and that the primary activity of ~~60~~ 58 percent of the visitors was fishing (Houser and North 2001).

Page 21-17, lines 10–17:

through an agreement with Reclamation. Reclamation and State Parks ~~are developing~~ have developed a joint resource management plan and general plan (Reclamation and State Parks 20~~08~~10) that ~~will~~ offers guidance on how to manage the area as a whole. The purpose of the joint plan is to guide the use, development, and management of the lake and surrounding lands. The plan ~~will~~ covers recreational opportunities that are compatible with surrounding resources, and uses proposed in the plan ~~will be~~ are compatible with Reclamation's requirement to operate the reservoir for water delivery. A public draft of the plan was released in June 2008 and a final plan ~~is anticipated for 2009~~ was released in April 2010.

Pages 21-23 through 21-27, Table 21-4:

Table 21-4.
Summary of Impacts and Mitigation Measures – Recreation

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level				
REC-1: Increased Use of Facilities at Millerton Lake State Recreation Area and Demand for Recreation Opportunities at Millerton Lake and Vicinity	No-Action	LTS	--	LTS
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	No Impact	--	No Impact
	C2	No Impact	--	No Impact
REC-2: Increased Use of Recreation Facilities and Demand for Recreation Opportunities in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
REC-3: Effects of Construction, Operation, and Maintenance of New Projects or Facilities on Recreation Opportunities in the Restoration Area	No-Action	LTS	--	LTS
	A1	LTS	--	LTS
	A2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS
	B1	LTS	--	LTS
	B2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS
	C1	LTS	--	LTS
	C2	PS	REC-3: Restore Recreation Access and Facilities Affected by Construction, Operation, and Maintenance from Settlement Actions in the San Luis Unit of the San Luis National Wildlife Refuge	LTS

Table 21-4.
Summary of Impacts and Mitigation Measures – Recreation (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level (contd.)				
REC-4: Effects of Reintroducing Salmon to the Restoration Area on Reach 1 Angling Opportunities	No-Action	No Impact	--	No Impact
	A1	PS	REC-4: Enhance Fishing Access and Fish Populations on the Kings River below Pine Flat Dam	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
REC-5: Effects on Reach 1 Warm-Water Angling Opportunities from Program Actions within the Restoration Area	No-Action	No Impact	--	No Impact
	A1	PS	REC-5: Enhance Warm-Water Fishing Access and Fish Populations in the Vicinity of the San Joaquin River below Friant Dam	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
REC-6: Effects on Wildlife-Based Recreation Opportunities from Enhanced Wildlife Habitat Conditions Caused by Program Actions Within the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
REC-7: Effects of Construction, Operation, and Maintenance of New Projects or Facilities on Recreation Opportunities on the San Joaquin River Between Merced River and the Delta	No-Action	No Impact	--	No Impact
	A1	No Impact	--	No Impact
	A2	No Impact	--	No Impact
	B1	No Impact	--	No Impact
	B2	No Impact	--	No Impact
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table 21-4.
Summary of Impacts and Mitigation Measures – Recreation (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Program-Level (contd.)				
REC-8: Effects of Reintroducing Salmon to the San Joaquin River Between Friant Dam and the Merced River on Angling Opportunities Downstream	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
Recreation: Project-Level				
REC-9: Effects on Recreation Opportunities from Earlier Seasonal Drawdown of Millerton Lake Related to Timing of Release of Interim and Restoration Flows	No-Action	No Impact	--	No Impact
	A1	PS	REC-9: Extend Millerton Lake Boat Ramps or Construct a New Low-water Ramp to Allow Boat Launching at the Lower Pool Elevations that May Result from Interim and Restoration Flows during Dry and Critical-High Years	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
REC-10: Effects on Recreation Facilities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS
REC-11: Effects on Swimming or Wading and Fishing Opportunities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS	--	LTS
	A2	LTS	--	LTS
	B1	LTS	--	LTS
	B2	LTS	--	LTS
	C1	LTS	--	LTS
	C2	LTS	--	LTS

Table 21-4.
Summary of Impacts and Mitigation Measures – Recreation (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Project-Level (contd.)				
REC-12: Effects on Boating Opportunities from Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	~~Significant~~PS	REC-12: Develop and Implement Recreation Outreach Program	LTS
	A2	~~Significant~~PS		LTS
	B1	~~Significant~~PS		LTS
	B2	~~Significant~~PS		LTS
	C1	~~Significant~~PS		LTS
	C2	~~Significant~~PS		LTS
REC-13: Effects on Wildlife-Based Recreation Opportunities from Enhanced Wildlife Habitat Conditions Related to Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
REC-14: Effects on Warm-Water Fishing Opportunities from Enhanced Fish Populations Related to Increased Flow in the Restoration Area	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Table 21-4.
Summary of Impacts and Mitigation Measures – Recreation (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Recreation: Project-Level (contd.)				
REC-15: Effects on Warm-Water Fishing Opportunities from Increased Flow in the San Joaquin River from the Merced River to the Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial
REC-16:Effects on Warm-Water and Cold-Water Fishing Opportunities from Increased Flow into the Sacramento-San Joaquin Delta	No-Action	No Impact	--	No Impact
	A1	LTS and Beneficial	--	LTS and Beneficial
	A2	LTS and Beneficial	--	LTS and Beneficial
	B1	LTS and Beneficial	--	LTS and Beneficial
	B2	LTS and Beneficial	--	LTS and Beneficial
	C1	LTS and Beneficial	--	LTS and Beneficial
	C2	LTS and Beneficial	--	LTS and Beneficial

Key:
-- = not applicable
LTS = less than significant
PS = potentially significant

Page 21-34, lines 7-12:

popular and accessible trout fishing opportunity. A survey completed in 2000 indicated that the primary activity of ~~60~~ <u>58</u> percent of the visitors to Lost Lake Park, on the upper end of Reach 1, was fishing (Houser and North 2001). Although the survey did not identify anglers by type (i.e., cold-water vs. warm-water), and game fish other than trout are present in the river and in the park, most of these <u>approximately 1,600</u> anglers, who were estimated to ~~number~~ <u>visit</u> nearly 18,000 <u>times</u> per year, are presumed to have been trout anglers.

Page 21-34, lines 21-22:

salmon are reintroduced. As a result, ~~the several thousand~~ trout anglers who ~~are believed to~~ take advantage of the stocked trout fishery on Reach 1 would be displaced.

Page 21-35, lines 38–40:

2009). There are a number of other large gravel pit ponds adjacent to Sycamore Island Park and elsewhere near the river in Reach 1, but ~~outside of Lost Lake in Lost Lake Park near Friant;~~ none are known to provide public fishing opportunities. The Lost Lake Park

Page 21-50, line 21:

impact would be <u>**potentially**</u> **significant**.

Page 21-52, line 18:

spring boating in Reach 1 would be <u>potentially</u> significant.

4.16 Chapter 22.0, "Socioeconomics"

Page 22-54, line 14:

on socioeconomics would be significant if ~~program~~ <u>project</u> operations would do any of the

Page 22-56, lines 40-43:

The effects on regional employment are considered to be beneficial during construction activities and less than significant in the long term after construction-related activities are completed and some currently agricultural lands are taken out of production for Restoration-related construction footprints. <u>The program-level actions of Alternative A1 would not alter the long-term effects of operating Friant Dam, which are discussed in Impact SOC-4.</u>

Page 22-65, lines 26–29:

corresponding decrease in population) in the short term. In the long term, regional population levels would decrease because of the loss of agricultural land, but this decrease would be small and offset by operational effects on recreation and retail jobs (see discussion of Impact SOC-6<u>; program-level actions of Alternative A1 would not</u>

alter the long-term effects of operating Friant Dam, which are discussed in Impact SOC-5). This impact would be less than significant.

Page 22-66, lines 31–34:

farm labor losses (and corresponding decrease in housing demand). However, in the long term, construction activities would cease while loss of agricultural lands from construction-related footprints would continue ~~long term~~. However, ~~W~~when considering these effects with operational effects (which are discussed in Impact SOC-6)~~, however,~~ the impact on housing would be less than significant.

Page 22-67, lines 18–23:

Socioeconomic impacts associated with operational changes under Alternative B1 would be the result of ~~include impacts associated with~~ the operation of Friant Dam and recapture of Interim and Restoration flows at existing facilities within the Restoration Area and the Delta, ~~as described in the section on project level impacts. Additional program-level impacts would occur because of~~ and recapture of Interim and Restoration flows along the San Joaquin River between the Merced River and the Delta using existing facilities.

Page 22-67, lines 30–31:

Table 22-36 shows the impacts that project operations ~~the recapture of Interim and Restoration flows~~ under Alternative B1 may have on annual employment in the Friant Division.

Page 22-75, lines 5–8:

Project-level actions are the same for all action alternatives; therefore, the project-level impacts are the same for Alternatives A1 through C2. Project-level impacts under the action alternatives would occur from ~~re~~operation of Friant Dam and recapture of Interim and Restoration flows, as described in Chapter 2.0, “Description of Alternatives.” Program-level actions of Alternatives B1 through C2 would alter these project-level impacts. For these alternatives, see Section 22.3.3, “Program-Level Impacts and Mitigation Measures for Program-level Discussion of Operational Impacts.”

4.17 Chapter 23.0, “Transportation and Infrastructure”

Page 23-16, line 7:

significant if ~~project~~ alternative implementation would do any of the following:

4.18 Chapter 24.0, "Utilities and Service Systems"

Page 24-10 through 24-14, Table 24-2:

Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level				
UTL-1: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	No-Action	PS	–	PS
	A1	LTS	–	LTS
	A2	LTS	–	LTS
	B1	LTS	–	LTS
	B2	LTS	–	LTS
	C1	LTS	–	LTS
	C2	LTS	–	LTS
UTL-2: Potential Reduction in Ability of Facilities in the Restoration Area to Meet Wastewater Treatment Requirements	No-Action	LTS	–	LTS
	A1	PS	UTL-2: Obtain Required Permits for Hatchery Wastewater Discharges and Implement Best Management Practices to Reduce Pollutant Discharges	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS

**Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level (contd.)				
UTL-4: Potential for Generation of Solid Waste in the Restoration Area in Excess of Permitted Landfill Capacity	No-Action	LTS	–	LTS
	A1	PS	UTL-4: Identify Landfills with Adequate Permitted Capacity to Accept Solid Waste Generated by Settlement Activities and Dispose of Waste in Accordance with Applicable Regulations	LTS
	A2	PS		LTS
	B1	PS		LTS
	B2	PS		LTS
	C1	PS		LTS
	C2	PS		LTS
UTL-5: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services in the Restoration Area	No-Action	LTS	–	LTS
	A1	LTS	–	LTS
	A2	LTS	–	LTS
	B1	LTS	–	LTS
	B2	LTS	–	LTS
	C1	LTS	–	LTS
	C2	LTS	–	LTS
UTL-6: Potential for Insufficient Existing Water Supply and Resources Between the Merced River and the Delta	No-Action	PS	–	PS
	A1	LTS	–	LTS
	A2	LTS	–	LTS
	B1	LTS	–	LTS
	B2	LTS	–	LTS
	C1	LTS	–	LTS
	C2	LTS	–	LTS

Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Program-Level (contd.)				
UTL-3: Potential for Insufficient Water Supply and Resources in the Restoration Area	No-Action	PS	–	PS
	A1	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
	A2	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
	B1	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
	B2	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
	C1	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
	C2	Too Speculative for Meaningful Consideration	–	Too Speculative for Meaningful Consideration
UTL-7: Potential for Generation of Solid Waste Between the Merced River and the Delta in Excess of Permitted Landfill Capacity	No-Action	LTS	–	LTS
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	LTS	–	LTS
	C2	LTS	–	LTS
UTL-8: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services Between the Merced River and the Delta	No-Action	LTS	–	LTS
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	LTS	–	LTS
	C2	LTS	–	LTS

Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
Utilities and Service Systems: Project-Level				
UTL-9: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities in the Restoration Area	No-Action	PS	–	PS
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	No Impact	–	No Impact
	C2	No Impact	–	No Impact
UTL-10: Potential Reduction in Ability of Facilities in the Restoration Area to Meet Wastewater Treatment Requirements	No-Action	LTS	–	LTS
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	No Impact	–	No Impact
	C2	No Impact	–	No Impact
UTL-11: Potential for Insufficient Existing Water Supply and Resources ~~in the Restoration Area~~	No-Action	PS	–	PS
	A1	PSU	–	PSU
	A2	PSU	–	PSU
	B1	PSU	–	PSU
	B2	PSU	–	PSU
	C1	PSU	–	PSU
	C2	PSU	–	PSU

Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems (contd.)

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
UTL-12: Potential for Generation of Solid Waste in the Restoration Area in Excess of Permitted Landfill Capacity	No-Action	LTS	–	LTS
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	No Impact	–	No Impact
	C2	No Impact	–	No Impact
UTL-13: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services in the Restoration Area	No-Action	LTS	–	LTS
	A1	LTS	–	LTS
	A2	LTS	–	LTS
	B1	LTS	–	LTS
	B2	LTS	–	LTS
	C1	LTS	–	LTS
	C2	LTS	–	LTS
UTL-14: Potential Environmental Effects Associated with Needed Construction or Expansion of Water and Wastewater Treatment Facilities Between the Merced River and the Delta	No-Action	No Impact	–	No Impact
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	No Impact	–	No Impact
	C2	No Impact	–	No Impact

**Table 24-2.
Summary of Environmental Consequences and Mitigation Measures – Utilities and Service Systems (contd.)**

Impacts	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Utilities and Service Systems: Project-Level (contd.)				
UTL-15: Potential Reduction in Ability of Facilities Between the Merced River and the Delta to Meet Wastewater Treatment Requirements	No-Action	No Impact	–	No Impact
	A1	No Impact	–	No Impact
	A2	No Impact	–	No Impact
	B1	No Impact	–	No Impact
	B2	No Impact	–	No Impact
	C1	No Impact	–	No Impact
	C2	No Impact	–	No Impact
~~UTL-16: Potential for Insufficient Existing Water Supply and Resources from Recapture of Interim and Restoration Flows Between the Merced River and the Delta~~	~~No-Action~~	~~No Impact~~	~~–~~	~~No Impact~~
	~~A1~~	~~PSU~~	~~–~~	~~PSU~~
	~~A2~~	~~PSU~~	~~–~~	~~PSU~~
	~~B1~~	~~PSU~~	~~–~~	~~PSU~~
	~~B2~~	~~PSU~~	~~–~~	~~PSU~~
	~~C1~~	~~PSU~~	~~–~~	~~PSU~~
	~~C2~~	~~PSU~~	~~–~~	~~PSU~~
UTL-17: Potential Need for New or Altered Facilities to Accommodate Increased Demand for Emergency Services Between the Merced River and the Delta	No-Action	No Impact	–	No Impact
	A1	LTS	–	LTS
	A2	LTS	–	LTS
	B1	LTS	–	LTS
	B2	LTS	–	LTS
	C1	LTS	–	LTS
	C2	LTS	–	LTS

Key:
– = not applicable
Delta = Sacramento-San Joaquin Delta
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable

Page 24-31, lines 11-15:

~~**Impact UTL-16 (Alternatives A1 through C2):** ***Potential for Insufficient Existing Water Supply and Resources from Recapture of Interim and Restoration Flows Between the Merced River and the Delta – Project-Level.*** This impact would be the same as Impact UTL-11 (Alternatives A1 through C2). The impact would be **potentially significant and unavoidable**.~~

4.19 Chapter 25.0, “Visual Resources”

Page 25-5, lines 25-26:

Scenic Highway Program are found in the Streets and Highways Code, Sections 260 through –263

(Caltrans 2012~~2007~~).

4.20 Chapter 26.0, “Cumulative Impacts”

Page 26-14, line 25:

The ~~Final~~ Conformed EIR was published in December 2005~~6~~ (DWR). The work was scheduled for

Page 26-17, line 16:

EIS/R~~, which are anticipated for publication in summer 2010~~ (DWR 2009d).

Page 26-26, line 21:

the north side of Woodward Regional Park (~~DWR 2009g~~SJRPCT 2002). The property is owned by the

Page 26-28, lines 19-20:

advisory body created by State statute in 1990, adopted the *Recompiled San Joaquin River Parkway Master Plan* (SJRC 2000) ~~*San Joaquin River Parkway Task Force Plan* in 1992 (SJRC 1992). In 2000, goals, objectives, and policies from the interim master plan were recompiled (SJRC 2000)~~.

Page 26-35, lines 24-25:

~~Table 26-3 presents a summary of impacts where the impact was determined to make a considerable incremental contribution to an overall significant cumulative impact.~~ The

Page 26-37, line 34:

Long-term ~~re~~operation of Friant Dam for the release of Interim and Restoration flows would not emit ROG, NO_X, PM_{10}, and $PM_{2.5}$.

Page 26-42, lines 22-23:

implementation of the appropriate mitigation identified in the Physical Monitoring and Management Plan ~~for Physical Conditions within the Restoration Area~~ (Appendix D).

Page 26-42, lines 43-44:

identified in the Physical Monitoring and Management Plan ~~for Physical Conditions within the Restoration Area~~ (Appendix D). Therefore, the action alternatives would not cause a

Page 26-43, lines 6-7:

invasive plant species in the Restoration Area. Also at a regional scale, the operation of Friant Dam for the release of Interim and Restoration flows would substantially increase the extent and functions provided by riparian

Page 26-43, line 21:

and possibly by localized inundation resulting from ~~re~~operation of Friant Dam for the release of Interim and Restoration flows. These

Page 26-43, line 36:

some instances to ~~re~~operation of Friant Dam for the release of Interim and Restoration flows, could affect any of the special-status

Page 26-44, line 20:

Section 106 of the NHPA and implementation of a ~~programmatic agreement~~PA for the

Page 26-54, Line 27:

The amount of Interim and Restoration flows would change over time as ~~programmatic~~

Page 26-55, lines :

not to a less-than-significant level. Because implementation of- Mitigation Measure NOI-1 would not reduce the cumulatively significant construction noise impact to a- less-than-significant level, the contribution of construction noise from ~~the~~ program-related actions

Page 26-58, line 15:

vectors. ~~Re~~operation of Friant Dam for the release of Interim and Restoration flows could also result in a potentially significant impact

Page 26-58, line 32:

However, mitigation measures ~~20~~PHH-1 through ~~20~~PHH-4 would be included to reduce potentially

Page 26-62, line 33:

Implementation of Mitigation Measure ~~23~~TRN-1 would reduce short-term construction

Page 26-63, lines 20-24:

Measure ~~23~~TRN-2 would reduce the significance of the impacts to a less-than-significant level. Implementation of that mitigation measure would ensure that no damage to existing gas pipelines and other utility lines would occur. No significant cumulative impact would occur because no hazard to these utilities currently exists, implementation of Mitigation Measure ~~23~~TRN-2 would protect pipelines and utilities from damage, and protection of utility

Page 26-64, lines 11-12:

Implementation of Mitigation Measure ~~23~~TRN-3, in combination with Mitigation Measure ~~23~~TRN-1, would reduce the significance of the impacts to a less-than-significant level.

Page 26-64, line 25:

~~23~~TRN-5 would eliminate this impact on bicycle and pedestrian circulation by relocating

4.21 Chapter 27.0, "Other NEPA and CEQA Considerations"

Page 27-1, line 15:

impacts to a less-than-significant level~~, as summarized in Table 27-1~~. If a specific impact

Page 27-17, line 15:

~~Re~~operating Friant Dam for the release of Interim and Restoration flows in accordance with the Act would commit up to 10 percent of

Page 27-18, line 33:

~~Re~~operating Friant Dam for the release of Interim and Restoration flows would increase recreation, but this increase would be insufficient

Page 27-22, lines 9-10:

B1 would have the least adverse impacts on climate change. Alternatives A2, B2, and C2 would have the greatest long-term benefit to climate change associated with increased ~~by increasing~~ riparian and floodplain habitat, which has the

4.22 Chapter 28.0, "Consultation, Coordination, and Compliance"

Page 28-12, lines 20 through 22:

In the USACE Sacramento District, navigable waters of the United States in the study area that are subject to the requirements of the RHA include but are not limited to all waterways in the Sacramento–San Joaquin drainage basin affected by tidal action. The San Joaquin River is subject to the requirements of the RHA to river mile 236. Sections of the River and Harbors Act

Page 28-12, lines 24-32:

Section 14. Under RHA Section 14 (33 USC 408), referred to as "Section 408," the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for alteration of the Federal levee system by a non-Federal entity if the alteration would not be injurious to the public and would not impair the usefulness of the project. These actions could include degradations, raisings, realignments, or other alteration or modifications to the Federal levee system~~ which would cause significant changes to the authorized flood control project's scope~~. Certain actions could alter the Federal levee system and be undertaken by a non-Federal entity, such as DWR. These project- and program-level actions need further development to determine whether they would be subject to Section 408 requirements.

Page 28-19, line 7:

preservation, consider alternatives to lessen the adverse effects (7 CFR Part 685.1). As a

Pages 28-22, line 36, through 28-25, line 7:

California Environmental Quality Act

Prompted by the passage of NEPA in 1969, CEQA was signed into law in 1970 as California's counterpart to NEPA. CEQA is a statute that requires State and local agencies to identify the significant environmental impacts of their actions and avoid or mitigate those impacts, if feasible. The objectives of CEQA are to do all of the following:

- Disclose to decision-makers and the public the significant environmental effects of proposed activities
- Identify ways to avoid or reduce environmental damage
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures
- Disclose to the public reasons for agency approval of projects with significant environmental effects

- Foster interagency coordination in the review of projects
- Enhance public participation in the planning process

Depending on the potential impacts of a proposed project, environmental information is presented in one of three CEQA documents: a Notice of Exemption, an Initial Study supporting either a Negative Declaration or Mitigated Negative Declaration, or an EIR.

As NEPA and CEQA lead agencies, respectively, Reclamation and DWR collaborated to prepare this joint PEIS/R. Project-level actions are analyzed in this PEIS/R at a project-specific level. Program-related actions would require future, project-specific preparation of NEPA and CEQA compliance documentation before implementation. This document identifies anticipated and probable significant effects of the program and project-level actions, as well as feasible mitigation measures. This document also compares No-Action Alternative and action alternatives to allow evaluation of their relative environmental consequences.

Trustee agencies are State agencies that have jurisdiction by law over natural resources affected by a project which are held in trust for the people of the State of California, per State CEQA Guidelines section 15386. Trustee agencies use the CEQA process to identify and comment on projects that could impact resources under their jurisdiction. Pursuant to Fish and Game Code Section 1802, DFG has jurisdiction over the conservation, protection, and management of fish, wildlife, and native plants, and the habitat necessary for biologically sustainable populations of those species.

Responsible agencies are public agencies that propose to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration (CEQA Guideline section 15381). CEQA documents provided by the lead agency should be written to allow responsible agencies to take subsequent discretionary actions subject to CEQA. DFG has been identified as a responsible agency that will have regulatory authority over natural resources that may be impacted under the action alternatives. DFG has regulatory authority over projects that could result in the “take” of any species by the State as threatened or endangered, pursuant to Fish and Game Code Section 2081. If the action alternatives could result in the “take” of any species listed as threatened or endangered under CESA, DFG may need to issue an Incidental Take Permit. Additionally, DFG has regulatory authority over activities in the bed, bank, or channel of lakes, rivers, and streams, under Section 1602 of the California Fish and Game Code. If any CEQA-related portion of the PEIS/R is invalidated, DFG will not be able to use that portion for subsequent discretionary approvals that are subject to CEQA.

California Endangered Species Act

Pursuant to CESA, a permit from DFG is required for projects that could result in the take of a plant or animal species that is State-listed as threatened, endangered or as a candidate species. Under CESA, “take” is defined as ~~an activity that would directly or indirectly kill an individual of a species, but unlike the Federal ESA, the CESA definition of take does not include “harming” or “harassing.” Section 86 of the California Fish and Game code defines Take as~~ to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill~~.~~" (California Fish and Game Code Section 86). As a result, the threshold for take is higher under CESA than under ESA (i.e., habitat modification is not necessarily considered take under CESA). Unlike the Federal ESA, the CESA definition of take does not include “harming” or “harassing.”

A separate incidental permit or multiple incidental take permits under Section 2081 of CESA will likely need to be obtained to implement subsequent site-specific projects ~~project-level actions~~. The appropriate process for obtaining incidental take authorization under CESA is determined based on DFG recommendations. DFG will rely on both program-level and project-level CEQA documents developed as part of SJRRP as appropriate to issue Incidental Take Permits.

CESA permit issuance criteria require that the impacts to State-listed species for which “take” authorization would be needed, are minimized and fully mitigated. This means that a project must not diminish the overall populations of State-listed species. In addition, project proponents are required to quantify and include the impacts of the permitted “take” of a State-listed species, together with all other impacts on the species that result from any act that would cause the proposed taking, per Title 14, CCR, Section 783.4.

Reclamation and DWR have involved DFG at the early stages of planning to incorporate avoidance measures for State-listed species that may be affected. As described in this document, project proponents for subsequent site-specific projects may obtain a 2081 ~~CESA~~ Incidental Take Permit prior to implementing ~~project-level~~ actions that would result in take of State-listed species.

California Fish and Game Code Sections 3503 and 3503.5 state that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, and that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders *Falconiformes* and *Stringiformes),* including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removing vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for issuing any type of incidental take permit.

This document identifies program-level actions that would potentially disturb nesting birds. To comply with Sections 3503 and 3503.5, this PEIS/R described conservation strategies to avoid disturbing nesting birds. These measures include conducting preconstruction surveys, ceasing vegetation removal activities if the vegetation is occupied by active nests, and establishing environmentally sensitive areas around nesting birds to minimize construction disturbance of any nesting pair, and to avoid forced fledging. In addition to the measures stated above, the program will continue to consult with DFG on SJRRP activities, as appropriate.

Page 28-24, line 38, through page 28-25, line 5:

based on the value of those waterways to fish and wildlife. A DFG ~~s~~Streambed ~~a~~Alteration ~~a~~Agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

This combined PEIS/R identifies potential program-level actions that would require the alteration of stream features subject to Section 1602 of the California Fish and Game Code. Project proponents for subsequent site-specific projects that could result in the alteration of stream features subject to Section1602, will apply for a Streambed Alteration Agreement from the DFG. Issuance of Streambed Alteration Agreements will rely on adequate impact analysis in this PEIS/R in addition to subsequent CEQA compliance documents, as appropriate. Project-level actions detailed in this PEIS/R are not anticipated to result in

Page 28-26, lines 20-23:

~~San Joaquin River Settlement~~ Act, Reclamation will initially petition SWRCB for its approval of project-level water right changes pursuant to applicable provision of the California Water Code in order to accomplish these project-level actions. The water rights involved in implementing the ~~San Joaquin River Settlement~~ Act are licensed water right Application 23, and permitted water right Applications ~~23,~~ 234, 1465, and 563~~8~~26, which presently authorize storage, direct diversion, and

Page 28-26, lines 28:

- Dedicate Interim and Restoration flows, made available through the dedication of releases of previously stored or bypassed water at Friant Dam, to instream fish and wildlife purposes

Page 28-26, lines 40-42:

- Authorize Fish and Wildlife Preservation and Enhancement as a purpose of use for Interim and Restoration flows within all the protected reaches described above and within the boundaries of the Lone Tree and East Bear Creek units

Page 28-28, between lines 1 and 2

"Waters of the State" means any surface water or groundwater, including saline waters, within the boundaries of the State (California Water Code Section 13050 (e)).

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4.24 Appendix D, "Physical Monitoring and Management Plan"

Page 4-2, lines 5-15:

~~Potential immediate actions to address a reduction in channel capacity include removal of vegetation and debris.~~ Potential responses to a reduction in channel capacity include removal of vegetation and debris and/or restrictions on Restoration flows that would exceed channel capacity. Vegetation removal would be conducted by mechanical or chemical means. Nonnative plant removal would receive priority over removal of native species. Immediate actions are described at a project-level in the PEIS/R. Any significant or potentially significant impacts of vegetation removal would be appropriately mitigated as described in the PEIS/R.

~~Potential responses to a reduction in channel capacity include removal of vegetation and debris and/or restrictions on Restoration flows that would exceed channel capacity. Vegetation removal would be conducted by mechanical or chemical means. Nonnative plant removal would receive priority over removal of native species. Any environmental impacts of vegetation removal would be appropriately mitigated.~~

Page 6-1, line 14-15:

The spawning gravel management objective would be met if gravel beds of sufficient quality and quantity are available for Chinook salmon spawning. The Fisheries Management Plan (Appendix E of this Draft PEIS/R) identifies a goal of 78,000 cubic meters of quality functioning spawning gravel.

4.25 Appendix G, "Plan Formulation"

Page 2-11, line 6:

Foundation 1992, as cited in McBain and Trush 2002). Tributaries that directly discharge into the Delta include the

Page 5-2, 10-13:

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4.26 Friant Dam Releases for Restoration Flows Attachment to Appendix G

Page 4-14, line 27:

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4.27 Appendix H, "Modeling"

Page 3-4, line 39:

the contractors. Therefore, the CalSim-II-simulated quantities of Class 1, Class 2, Section 215, and Paragraph 16(b) are not a precise representation of the classification that would have occurred in any given year, and may overestimate water supply deliveries. Minimum required releases below Friant Dam for riparian and contractor

Page 5-13, line 25:

in Table 5-5~~9~~.For the purposes of the technical analysis presented in the PEIS/R, the change in groundwater pumping and change in groundwater elevation data presented in Table 5-5 were used to replicate the linear relationships used in the Schmidt 2005 analysis. Relationships between groundwater pumping and groundwater depth within the

Page 5-14, line 1:

Table 5-5~~9~~.

Page 5-15, line 13:

Table 5-6 lists the Friant Division long-term contractors that were evaluated using the mass balance approach, the underlying DWR Bulletin 118 groundwater subbasins, the associated specific yield of the groundwater subbasin from DWR Bulletin 118-03 (DWR 2003), and the 2005 depth to water as presented in Schmidt 2005 or estimated from data obtained from the DWR WDL (DWR 2010). Although it is recognized that political boundaries do not control the physical environment, for

Page 5-15, between lines 15 and 16, Table 5-6:

**Table 5-6.
Mass Balance Tool Parameters**

District	DWR Bulletin 118 Groundwater Subbasin	Specific Yield	Depth to Water (feet)
City of Fresno	Kings	0.113	115[1]
City of Lindsay	Kaweah	0.108	53[1]
City of Orange Cove	Kings	0.113	27[1]
Fresno County Water Works District No. 18	Kings	0.113	69[1]
Fresno Irrigation District	Kings	0.113	85[2]
Garfield WD	Kings	0.113	160[2]
Gravelly Ford WD	Madera	0.104	140[2]
International WD	Kings	0.113	55[2]
Lewis Creek WD	Kaweah	0.108	55[2]
Madera County	Madera	0.104	112[1]
Stone Corral Irrigation District	Kaweah	0.108	40[2]
Tea Pot Dome Water District	Tule	0.095	155[2]
Terra Bella Irrigation District	Tule	0.095	140[2]

Notes:
[1] Average depth to water calculated from publically available data for wells stored on the DWR Water Data Library within the district boundary for the existing condition (2005).
[2] Depth to water for the existing condition (2005) available from Schmidt 2005.
Key:
DWR = California Department of Water Resources
WD = Water District

Page 5-19, line 1:

Table 5-7~~5~~

Page 5-23, line 6:

delivery year annual averages. Table 5-8~~6~~ summarizes these long-term averages.

Page 5-23, line 7:

Table 5-8~~6~~

Page 5-24, line 10:

model. Table 5-9~~7~~ summarizes the average annual Delivery year total for all Friant contractors.

Page 5-24, line 11:

Table 5-9~~7~~

Page 6-7, line 10:

analysis. Figure 6-2——shows the current CalSim regions.

4.28 Appendix I, “Supplemental Hydrologic and Water Operations Analyses”

Page vi, after line 6:

San Joaquin River Underseepage Limiting Capacity Analysis

4.29 Fishes of the San Joaquin River Restoration Area Attachment to Appendix K

Page 2-3, Lines 15-16:

however, no evidence of spawning is present (Kohlhorst et al.1976, Kohlhorst et al. 1991~~;~~ ~~both~~ as cited in USFWS 1995). Landlocked populations are located above major dams in

Page 2-3, Line 26:

Restoration Area (Brown and Moyle 1993, ~~Schaffter 1997, Brown 1998,~~ DFG 2007).

Page 2-5, Lines 16-17:

the Restoration Area (~~Brown 1998,~~ Brown 2000, Moyle 2002, DFG 2007). ~~No direct evidence exists that the southern DPS of North American green sturgeon were historically present in the Restoration Area, though modeling suggests historical habitat may have been suitable for the species (Mora et al. 2007).~~ North American green

Page 2-8, Line 17:

(~~Mathews 1965, Murphy 1948,~~ Moyle 2002). Initiation of spawning depends on water

Page 2-8, Lines 28-29:

elevated salinity and alkalinity concentrations, and temperatures up to 30°C (Knight 1985, as cited in Moyle 2002). While they can tolerate temperatures as low as 6°C, low water temperatures might

Page 2-21, Line 18:

(Meng and Moyle 1995,~~;~~ Meng et al. 1994~~, as cited in Moyle 2002~~). In general, splittail

Page 2-21, Line 20:

and reportedly rare in southern San Francisco Bay (Leidy 2007~~1984~~). Splittail abundance

Page 2-21, Line 23:

year classes (Sommer et al. 1997, Turner 1966~~; both~~ as cited in Moyle 2002).

Page 2-21, Lines 29-30:

(Baxter 2000, Baxter 1999, Baxter et al. 1996 as cited in Moyle 2002, Sommer et al. 1997~~; all as cited in Moyle 2002~~). Currently the Sutter and Yolo bypasses along the lower Sacramento River appear

Page 2-22, Lines 3-4:

during the drought of 1987 to 1993 (~~Moyle et al. 1995,~~ USFWS 1996, USFWS 1999a;~~ all~~ both as cited in Moyle 2002; Moyle et al. 1995, DFG 20010~~8~~). On June 23, 2000, the Federal Eastern District Court

Page 2-22, Line 8:

species (DFG 20010~~8~~). The DFG (1992) estimates that splittail during most years are only

Page 2-23, Lines 11-12:

100,000 or more eggs (Daniels and Moyle 1983, Feyrer and Baxter 1998~~; both~~ as cited in Moyle 2002). Fecundity has been found to be highly variable, however, and may be

Page 2-23, Lines 16-17:

inches (1.0 to 1.6 mm) in diameter (Wang 1986, Feyrer and Baxter 1998~~; both~~ as cited in Moyle 2002), begin to hatch within 3 to 7 days, depending on temperature (Bailey 1994).

Page 2-23, Lines 25-26:

deeper water as they become stronger swimmers (Sommer et al. 1997, Wang 1986~~; both as cited in Moyle 2002~~). Although juvenile splittail are known to rear in upstream areas

Page 2-23, Line 30:

waters from April to August (Meng and Moyle 1995~~, as cited in Moyle 2002~~). Growth is

Page 2-23, Line 35:

(Young and Cech 1996~~, as cited in Moyle 2002~~). Juveniles and adult splittail demonstrate

Page 2-23, Line 37:

Cech 1995, as cited in McBain and Trust 2002~~Winternitz and Wadsworth 1997~~).

Page 2-23, Lines 40-41:

salinities of 10 to 18 ppt, although lower salinities may be preferred (Meng and Moyle 1995~~, as cited in Moyle 2002~~), and can survive low DO levels (0. 6 to 1. 2 milligrams per

Page 2-23, Lines 42-43:

liter (mg/L) for young-of-the-year, juveniles, and subadults) (Young and Cech~~ 1995,~~ 1996). Because splittail have a high tolerance for variable environmental conditions

Page 2-26, Line 4:

many young (Sommer et al. 1997, Meng and Moyle 1995~~; both as cited in Moyle 2002~~).

Page 2-34, Line 8-11:

Four runs of Chinook salmon occur in California: fall, late fall, winter, and spring (~~Leet et al. 1992,~~ Mills et al. 1997). Fall-run populations occur throughout the species' range and are currently the most abundant and widespread salmon runs in California (Mills et al. 1997, as cited in McBain and Trush 2002). Winter-run populations are limited to the Sacramento River basin and were

Page 2-34, Line 30:

estimated to have approached 300,000 fish (Reynolds et al. 1993~~, as cited in Yoshiyama et al. 1998~~). The last large run observed in the San Joaquin River was more than 56,000 fish in 1945 (Fry 1961~~, as cited in Moyle et al. 1995~~). Adult spring-run Chinook salmon

Page 2-34, Line 41:

(Mills et al. 1997, as cited in McBain and Trush 2002). In the San Joaquin Basin, fall-run Chinook historically spawned in the

Page 2-35, Lines 11-13:

low of about 100 resulting from the 1987 to 1992 dry period (EA 1997, as cited in McBain and Trush 2002). With increased precipitation and improved flow conditions, escapement has increased to 3,300 in 1996 (EA 1997, as cited in McBain and Trush 2002). From 1971 to 2007, hatchery production is estimated to have composed about

Page 2-36, Line 8:

outmigration, and other characteristics (Moyle et al. 1995~~1989~~).

Page 2-36, Line 28:

water years (Moyle et al. 1995~~1989~~). In the Sacramento system (the closest population of

Page 2-36, Line 36:

June (~~CFGC 1921,~~ Hatton and Clark 1942, as cited in McBain and Trush 2002), and holding occurred from April though mid-

Page 2-36, Lines 29-49:

mid-November (S.P. Cramer and Associates 2004, 2005; Cramer Fish Sciences ~~2006,~~ 2007).

Page 2-37, Lines 6-7:

waterfalls during upstream migration than coho salmon or steelhead (Nicholas and Hankin 1989, as cited in McBain and Trush 2002), due in part to slower swimming speeds and inferior jumping ability

Page 2-37, Lines 9-10:

compared to steelhead (Reiser and Peacock 1985; Bell 1986~~, as cited in Bjornn and Reiser 1991~~). Cruising speeds, which are used primarily for long-distance travel, range

Page 2-37, Lines 30-37:

offer appropriate spawning habitat (Nicholas and Hankin 1989, as cited in McBain and Trush 2002). Before, during, and after spawning, female Chinook salmon defend the redd area from other potential spawners (Burner 1951, as cited in McBain and Trush 2002). Briggs (1953, as cited in McBain and Trush 2002) observed that the defended area could extend up to 6 m (20 feet) in all directions from the redd. Redds may be defended by the female for up to a month (Hobbs 1937, as cited in McBain and Trush 2002). Males do not defend the redd but may exhibit aggressive behavior toward other males while defending spawning females (Shapovalov and Taft 1954). Generally, both male and female adults die within 2 weeks after spawning (ODFW 2005~~Kostow 1995~~), with females defending the redd until they become too weak to maintain position

Page 2-38, Lines 21-22:

Tuolumne River, and other rivers where gravel supplies may be limited by dams (EA 1992, as cited in McBain and Trush 2002).

Page 2-38, Line 19:

causing substantial mortality of the previously deposited eggs (~~McNeil 1964,~~ Hayes

Page 2-38, Lines 34-35:

lasts between 40 to 90 days at water temperatures of 6 to 12°C (Bams 1970, Heming 1982~~; both as cited in Bjornn and Reiser 1991~~). At temperatures of 2.7°C, time to 50

Page 2-38, Lines 36-37:

percent hatching can take up to 159 days (Alderdice and Velsen 1978~~, as cited by Healey 1991~~). The alevins remain in the gravel for 2 to 3 weeks after hatching and absorb their

Page 2-39, Line 3:

downstream throughout the year (Nicholas and Hankin 1989, as cited in McBain and Trush 2002). Although fry typically drift

Page 2-39, Line 20:

energy and avoiding predation and displacement by high flows (~~Chapman and Bjornn 1969,~~ Meehan and Bjornn 1991). Juvenile Chinook that overwinter in fresh water either migrate downstream in the fall to larger streams that have suitable winter habitat or enter interstitial spaces among cobbles and boulders whereupon growth is suspended for the winter (~~Chapman and Bjornn 1969,~~ Bjornn 1971, Everest and Chapman 1972, Carl and

Page 2-39, Lines 28-29:

migration and/or movement into the interstices of the substrate (Morgan and Hinojosa 1996, as cited in McBaine and Trush 2002). In some areas, such as the mainstem Fraser River, juveniles have been observed to continue feeding in the winter (Levings and Lauzier 1991~~, as cited in Morgan and Hinojosa 1996~~). Morgan and Hinojosa (1996, as cited in McBain and Trush) suggested that juvenile Chinook may

Page 2-39, Line 35:

than in the mainstem Sacramento River, and Moyle (2000, as cited in McBain and Trush 2002) observed similar results on the

Page 2-40, Line 7:

River (Stillwater Sciences 2008~~7~~) suggests that flow-through of water on inundated

Page 2-40, Line 34:

search of suitable winter cover (~~Stuehrenberg 1975,~~ Hillman et al. 1987).

Page 2-41, Line 2:

smoltification (Bjornsson and Bradley 2007~~Rich and Loudermilk 1991~~).

Page 2-41, Lines 22-23:

individuals are more likely to move downstream earlier than smaller juveniles (Nicholas and Hankin 1989, as cited in McBain and Trush 2002; Beckman et al. 1998), and it appears that in some systems juveniles

Page 2-41, Line 27:

Nicholas and Hankin (1989, as cited in McBain and Trush 2002) suggested that the duration of freshwater rearing is tied to

Page 2-41, Line 29:

temperatures. Bell (1958~~, as cited in Healey 1991~~) suggests that the timing of yearling

Page 2-41, Line 41:

estuaries, perhaps in response to the warmer temperatures in the Delta (~~Healey 1980,~~

Page 2-42, Line 5:

use the center of the channel (USFWS 1995~~1994~~). Other studies along the Pacific Coast also

Page 2-42, Line 13:

preparation for their life in saltwater~~ (summarized in Quinn 2005)~~. As Chinook salmon

Page 2-43, Line 6:

Oregon coast (Cramer 1987~~, as cited in Maragni 2001~~). Fall-run Chinook typically rear in

Page 2-44, Line 4:

holding during their upstream migration. Marcotte (1984, as cited in McBain and Trush 2002) reported that suitability of

Page 2-44, Lines 17-18:

(S.P. Cramer and Associates 2004, 2005; Cramer Fish Sciences ~~2006,~~ 2007) and the initiation of spawning~~ (DFG 2001, 2005)~~.

Page 2-44, Lines 34-36:

from small tributaries 2 to 3 m (6.6 to 9.8 feet) in width (Vronskiy 1972, as cited in McBain and Trush 2002) to large mainstem rivers (Healey 1991). Chinook prefer low-gradient (less than 3 percent) reaches for spawning and rearing, but will occasionally use higher gradient areas (ODFW 2005~~Kostow 1995~~).

Page 2-44, Line 38:

streambed topography (Burner 1951, as cited in McBain and Trush 2002). Redds are typically located near pool tailouts (i. e.,

Page 2-45, Line 4:

smaller redds and use finer gravels than fall-run Chinook (Burner 1951, as cited in McBain and Trush 2002). Similarly, 4- and

Page 2-45, Line 9:

intragravel flow dynamics (Platts et al. 1979, as cited in McBain and Trush 2002). Chinook salmon may therefore have

Page 2-45, Lines 21-24:

in) to 78.0 mm (3.12 in) (Kondolf and Wolman 1993, as cited in McBain and Trush 2002). Chinook in the Central Valley have been observed to spawn in substrate with D_{50} ranging from 31 to 66 mm (1.22 to 2.60 in) (Van Woert and Smith 1962, unpubl. data, as cited in McBain and Trush 2002~~Kondolf and Wolman 1993~~).

Page 2-45, Line 29:

(~~Donaldson 1955,~~ Combs and Burrows 1957, Combs 1965, Eddy 1972, Bell 1991~~1973~~, ~~Healey 1979,~~ Reiser and Bjornn 1979, Garling and Masterson 1985, Appendix E,

Page 2-45, Lines 33-34:

14.4°C (58°F) for constant exposures (Combs and Burrows 1957, Combs 1965~~, Healey 1979~~). A more recent thermal tolerance study of Sacramento River fall-run Chinook

Page 2-45, Line 37:

(USFWS 1999b, as cited in McBain and Trush 2002).

Page 2-45, Line 43:

(Wickett 1954, Alderdice et al. 1958, Coble 1961, Silver et al. 1963, ~~McNeil 1964, Cooper 1965,~~ Shumway et al. 1964~~, Koski 1981~~). Excessive concentrations of substrate

Page 2-46, Lines 1-3:

1988, Kondolf 2000). ~~There is a strong possibility that turbidity also affects egg survival as a result of clay-sized particles adhering to the egg's membrane (Stuart 1953), reducing the egg's ability to absorb DO.~~ This effect provides a good explanation of why salmonid

Page 2-46, Line 19:

and large tributaries (Nicholas and Hankin 1989, as cited in McBain and Trush 2002).

Page 2-46, Line 22:

debris (Lister and Genoe 1970, Everest and Chapman 1972~~, McCain 1992~~). As fry grow,

Page 2-47, Lines 11-13:

Banks et al. 1971, ~~Brett et al. 1982, Rich 1987~~), but decrease at higher temperatures, with temperatures greater than 23.3°C (74°F) being potentially lethal (Hanson 1990). Nicholas and Hankin (1989, as cited in McBain and Trush 2002) suggest that the duration of freshwater rearing is tied to water

Page 2-47, Line 21:

slow water (Shirvell 1994~~, Steward and Bjornn 1987~~). Hillman et al. (1987) found that

Page 2-49, Line 20:

Malibu Creek in Southern California (Barnhart 1991 as cited in McBain & Trush 2002, NMFS 1996a). Two major genetic

Page 2-49, Line 22:

separated by the Cascade Range crest (~~Schreck et al. 1986,~~ Reisenbichler et al. 1992).

Page 2-49, Lines 24-25:

where they still occur they are normally more widely distributed than Chinook (Voight and Gale 1998~~, as cited in McEwan 2001~~; Yoshiyama et al. 1996), and are typically

Page 2-50, Line 35:

(Meehan and Bjornn 1991, Behnke 1992<u>, as cited in McBain and Trush 2002</u>). The general timing of winter steelhead in

Pages 2-52 – 2-53:

Table 2-2.
Central Valley Winter Steelhead Life History Timing

Life Stage	Month: Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Notes and Sources
Adult migration													Geographic area: Sacramento River, above the mouth of the Feather River Trapping adults between 1953 and 1959 found a peak in late September, with some fish migrating from late June through March (Hallock et al. 1961~~, as cited in McEwan 2001~~).
Adult migration													Geographic area: Sacramento River, Red Bluff diversion dam Small numbers of adults all year, with a peak in early October (USFWS unpublished data, as cited in McEwan 2001)
Adult migration													Geographic area: Mill Creek Adult counts from 1953 to 1963 showed a peak in late October, and a smaller peak in mid-February (Hallock 1989~~, as cited in McEwan 2001~~).
Adult migration													Jones & Stokes 2002 Foundation Runs Report Geographic area: not stated Adult steelhead enter freshwater from late December through late April. No citation.
Spawning													Mills and Fisher 1994
Spawning													Peak spawning in California streams (McEwan 2001).
Spawning													Jones & Stokes 2002 Foundation Runs Report Geographic area: lower American River Spawning takes place December through April (Gerstung 1971 as cited in McBain and Trush)
Adult (kelts) return to sea													Mills and Fisher 1994
Incubation													Reynolds et al. 1993

Table 2-2.
Central Valley Winter Steelhead Life History Timing (contd.)

Life Stage	Month	Notes and Sources
Emergence		Eggs hatch in 30 days at 51°F (Leitritz and Lewis 1980, as cited in McEwan 2001).
Emergence		Jones & Stokes 2002 Foundation Runs Report Geographic area: lower American River Fry usually emerge in April and May, depending on water temperature and date of spawning (Gerstung 1971, as cited in McBain and Trush 2002).
Emergence		Jones & Stokes 2002 Foundation Runs Report Geographic area: San Joaquin River Based on the results of emergence analysis for water temperature in SJR, Jones & Stokes estimated that emergence may occur between March 15 and August 30.
Rearing		In California scale analysis showed 70 percent reared for 2 years, 29 percent for 1 year, and 1 percent for 3 years (Hallock et al. 1961~~, as cited in McEwan 2001~~).
Outmigration		Geographic area: Sacramento River Migrate downstream in every month of the year, with a peak in the spring, and a smaller peak in the fall (Hallock et al. 1961~~, as cited in McEwan 2001~~).
Outmigration		Geographic area: lower Sacramento Migrated past Knights landing in 1998 from late December through early May, and peaked in mid-March (DFG unpublished data, as cited in McEwan 2001).
Outmigration		Reynolds et al. 1993
Outmigration		Jones & Stokes 2002 Foundation Runs Report Geographic area: Woodbridge Dam Outmigrating yearling and older steelhead detected December~~January~~ through July, and young of year detected April through July (~~Natural Resource Scientists 1998~~ Boyd 2010).

Key:

	Span of light activity
	Span of moderate activity
	Span of peak activity

Page 2-54, Lines 4-7:

March (Hallock et al. 1961, Bailey 1954~~; both~~ as cited in McEwan and Jackson 1996) (Table 2-2). Spawning occurs primarily from January through March, but may begin as early as late December and may extend through April (Hallock et al. 1961~~, as cited in McEwan and Jackson 1996~~). Sixty-six adult steelhead were observed at Dennett Dam on

Page 2-54, Lines 13-15:

apparent environmental cues (Barnhart 1991, as cited in McBain & Trush 2002). Peak upstream movement appears to occur in the morning and evening, although steelhead have been observed to move at all hours (Barnhart 1991, as cited in McBain & Trush 2002). Steelhead are among the strongest swimmers of freshwater fishes.

Page 2-54, Lines 19-22:

bursts used in feeding and escape, range from 4.3 to 8.2 m/s (14 to 27 feet/s) (Bell 1991,~~1973, as cited in Everest et al. 1985;~~ Roelofs 1987, as cited in McBain and Trush 2002). Steelhead have been observed making vertical leaps of up to 5.2 m (17 feet) over falls (W. Trush, pers. comm., as cited in McBain and Trush 2002~~Roelofs 1987~~).

Page 2-54, Lines 36-37:

4,500 eggs per female has been observed within the Sacramento watershed (Mills and Fisher 1994~~, as cited in Leidy 2001~~). In cases where spawning habitat is limited, late-

Page 2-54, Line 42:

are females (Ward and Slaney 1988, Meehan and Bjornn 1991, Behnke 1992, as cited in McBain and Trush 2002). Repeat

Page 2-55, Lines 10-20:

Hatching of eggs follows a 20- to 100-day incubation period, the length of which depends on water temperature (Shapovalov and Taft 1954, Barnhart 1991, as cited in McBain & Trush 2002). In Waddell Creek (San Mateo County), Shapovalov and Taft (1954) found incubation times between 25 and 30 days. Newly hatched steelhead alevins remain in the gravel for an additional 14 to 35 days while being nourished by their yolk sac (Barnhart 1991, as cited in McBain & Trush 2002). Fry emerge from the substrate just before total yolk absorption under optimal conditions; later emerging fry that have already absorbed their yolk supply are likely to be weaker (Barnhart 1991, as cited in McBain & Trush 2002). Upon emergence, fry inhale air at the stream surface to fill their air bladder, absorb the remains of their yolk, and start to feed actively, often in schools (Barnhart 1991 as cited in McBain & Trush 2002, NMFS 1996b). Survival from egg to emergent fry is typically less than 50 percent (Meehan and Bjornn 1991), but may be quite variable, depending upon local conditions.

Page 2-55, Line 29:

from fry schools and establishing feeding territories (Barnhart 1991, as cited in McBain and Trush 2002). Peak feeding and

Page 2-55, Lines 34-35:

water temperatures are higher (Dambacher 1991). In the Smith River of Oregon, Reedy (1995, as cited in McBain and Trush 2002) suggested that rising stream temperatures and reduced food availability occurring

Page 2-55, Line 43:

steelhead (Everest et al. 1986, as cited in McBain and Trush 2002). Winter hiding behavior of juveniles reduces their

Page 2-56, Line 9:

(Meehan and Bjornn 1991). Reedy (1995, as cited in McBain and Trush 2002) found that steelhead in the tails of pools did

Page 2-56, Line 16:

(Dambacher 1991, Peven et al. 1994, Reedy 1995, as cited in McBain and Trush 2002). In relatively small tributaries with

Page 2-56, Lines 21-26:

to seek cover from high flows are available (Reedy 1995, as cited in McBain and Trush 2002), or they may return to tributaries for the winter (Everest 1973, as cited in Dambacher 1991). Rearing densities for juvenile steelhead overwintering in high-quality habitats with cobble-boulder substrates are estimated to range from approximately 2.7 fish/m^2 (0.24 fish/ft^2) (W. Trush, pers. comm., 1997) to 5.7 fish/m^2 (0.53 fish/ft^2) (Meyer and Griffith 1997). Reedy (1995, as cited in McBain and Trush 2002)

Page 2-56, Line 43:

(Barnhart 1991, as cited in McBain and Trush 2002) and physiological transformations occur that allow them to survive in

Page 2-57, Lines 12-18:

Most marine mortality of steelhead occurs soon after they enter the ocean and predation is believed to be the primary cause of this mortality (Pearcy 1992~~, as cited in McEwan and Jackson 1996~~). Because predation mortality and fish size are likely to be inversely related (Pearcy 1992~~, as cited in McEwan and Jackson 1996~~), the growth that takes place in estuaries may be very important for increasing the odds of marine survival (Bond

2006; Pearcy 1992~~, as cited in McEwan and Jackson 1996~~; Simenstad et al. 1982, as cited in NMFS 1996a; Shapovalov and Taft 1954).

Page 2-57, Line 22:

rear for 1 to 6 months in the estuary before entering the ocean (Barnhart 1991, as cited in McBain and Trush 2002).

Page 2-57, Lines 29-30:

remain in salt water for a longer period than larger smolts (Chapman 1958, Behnke 1992, as cited in McBain and Trush 2002). Larger smolts have been observed to experience higher ocean survival rates (Ward

Page 2-57, Line 39:

remain in salt water for a longer period than larger smolts (~~Chapman 1958,~~ Behnke

Page 2-57, Lines 43-44:

(Shapovalov and Taft 1954, Barnhart 1991, as cited in McBain and Trush 2002). Steelhead staying in the ocean for 2 years typically weigh 3.2 to 4.5 kg (7 to10 lbs) upon return to fresh water (Roelofs 1985, as cited in McBain and Trush 2002).

Page 2-58, Line 4:

Pacific Ocean (Barnhart 1991, as cited in McBain and Trush 2002).

Page 2-58, Line 8:

holding (Puckett 1975, as cited in McBain and Trush 2002; Roelofs 1983, as cited in Moyle et al. 1995~~1989~~). Deep pool habitat

Page 2-58, Lines 15-16:

likely to affect adult movements than depth (Barnhart 1986~~, as cited in McEwan and Jackson 1996~~). Velocities over 2.4 m/s (8 ft/s) may hinder upstream movement

Page 2-58, Lines 17-21:

(Thompson 1972, as cited in McBain and Trush 2002~~Everest et al. 1985~~). Steelhead are capable of ascending high barriers under suitable flow conditions and have been observed to make vertical leaps of up to 5.1 m (17 ft) over waterfalls (W. Trush, pers. comm., as cited in McBain and Trush 2002~~Roelofs 1987~~). Deep pools provide important resting and holding habitat during the upstream migration (Puckett 1975, as cited in McBain and Trush 2002; Roelofs 1983, as cited in Moyle et al. 1995~~1989~~).

Page 2-58, Line 28:

range from 39 to 52°F (4 to 11°C) (McEwan and Jackson 1996, Bell ~~1973,~~ 1991), with

Page 2-58, Line 32:

to perennial streams after hatching (Moyle et al. 1995~~1989~~). In the Rogue River watershed,

Page 2-58, Line 34:

steelhead typically spawn in permanent streams (Roelofs 1985, as cited in McBain and Trush 2002).

Page 2-59, Table 2-3:

Table 2-3.
Temperature Thresholds for Steelhead Adult Migration and Spawning

Life History Stage	Temperature	Comments	Source
Adult migration	46 to 52°F (8 to 11°C)	Preferred	McEwan and Jackson 1996
	>70°F (21°C)	Stressful (Columbia River)	Lantz 1971, as cited in Beschta et al. 1987
Spawning	39 to 49°F (4 to 9°C)	Preferred	Bell ~~1973,~~ 1991
	39 to 52°F (4 to 11°C)	Preferred	McEwan and Jackson 1996
	68°F (20°C)	Stressful	FERC 1993, as cited in McBain and Trush 2002
	>72 °F (>22°C)	Lethal	FERC 1993, as cited in McBain and Trush 2002
	75°F (24°C)	Upper lethal	Bell 1991

Key:
> = greater than
°C = degrees Celcius
°F = degrees Fahrenheit
FERC = Federal Energy Regulatory Commission

Page 2-59, Line 5:

steelhead (Moyle et al. 1995~~1989~~, Barnhart 1991, as cited in McBain and Trush 2002). Pool tailouts or heads of riffles with well-

Page 2-59, Lines 12-14:

to range from 10.4 mm (0.41 in) (Cederholm and Salo 1979~~, as cited in Kondolf and Wolman 1993~~) to 46.0 mm (1.8 in) (Orcutt et al. 1968~~, as cited in Kondolf and Wolman 1993~~). Steelhead pairs have been observed spawning within 1.2 m (3.9 feet) of each other

Page 2-59, Line 20:

mortality (Barnhart 1991, as cited in McBain and Trush 2002). Temperature thresholds for the incubation, rearing, and

Page 2-59, Line 23:

(McEwan and Jackson 1996, FERC 1993, as cited in McBain and Trush 2002).

Page 2-60, Table 2-4:

Table 2-4.
Temperature Thresholds for Incubation, Rearing, and Outmigration of Steelhead

Life History Stage	Temperature °F (°C)	Comments	Source
Incubation	50°F (10°C)	Preferred (hatching)	Bell 1991
	48 to 52°F (9 to 11°C)	Preferred (incubation and emergence)	McEwan and Jackson 1996 FERC 1993, as cited in McBain and Trush 2002
	>55°F (>12.8°C)	Stressful	FERC 1993, as cited in McBain and Trush 2002
	60°F (15.6°C)	Lethal	FERC 1993, as cited in McBain and Trush 2002
Juvenile rearing	48 to 52°F (9 to 11°C)	Preferred (fry and juvenile rearing)	McEwan and Jackson 1996
	55 to 65°F (12.8 to 18.3°C)	Optimal	FERC 1993, as cited in McBain and Trush 2002
	62.6 to 68°F (17 to 20°C)	Preferred (Central Valley Steelhead)	Myrick 1998, as cited in McBain and Trush 2002 ~~(p.134)~~
	50 to 59°F (10 to 15°C)	Preferred	Moyle et al. 1995
	68°F (20°C)	Sustained upper limit	Moyle et al. 1995
	77°F (25°C)	Lethal	FERC 1993, as cited in McBain and Trush 2002
	80°F (27°C)	Lethal critical thermal maximum (Central Valley Steelhead - absolute maximum temperature tolerated)	Myrick 1998, as cited in McBain and Trush 2002
Smolt outmigration	<57°F (14°C)	Preferred	McEwan and Jackson 1996
	>55°F (13°C)	Stressful (inhibit gill ATPase activity)	~~Zaugg and Wagner 1973,~~ Adams et al., 1975;~~, both~~ Zaugg and Wagner 1973, as cited in McBain and Trush 2002~~ODEQ 1995~~

Key:
°C = degrees Celsius
°F = degrees Fahrenheit
FERC = Federal Energy Regulatory Commission
~~ODEQ = Oregon Department of Environmental Quality~~

Page 2-61, Line 7:

rapid and cascade habitats (~~Bisson et al. 1982,~~ Bisson et al. 1988). Age 1+ fish typically

Page 2-61, Lines 11-12:

cover, and low light intensities (Hartman 1965, ~~Facchin and Slaney 1977,~~ Ward and Slaney 1979 as cited in McBain and Trush 2002, Fausch 1993). Age 1+ steelhead appear to avoid secondary channel and

Page 2-61, Line 19:

and Chapman 1972, Bisson et al. 1988, Fausch 1993). Reedy (1995, as cited in McBain and Trush 2002) indicates that 1+

Page 2-61, Line 29:

swifter water velocities and shallower depths than coho salmon (~~Sullivan 1986,~~ Bisson et

Page 2-61, Line 37:

summer (Sullivan 1986~~, Bisson et al. 1982~~).

Page 2-61, Line 40:

1996) (Table 2-4). Myrick (1998, as cited in McBain and Trush 2002) provides the only assessment of temperature tolerances

Page 2-62, Line 26:

populations (ODFW 2005~~Kostow 1995~~). Evidence suggests that increased ocean temperatures

Page 2-62, Lines 28-33:

productivity with significant effects on steelhead growth and survival (Barnhart 1991, as cited in MBain and Trush 2002). Steelhead appear to prefer ocean temperatures of 9 to 11.5ºC (48.2 to 52.7ºF) and typically swim in the upper 9 to 12 m (29.5 to 39.6 ft) of the ocean's surface (Barnhart 1991, as cited in McBain and Trush 2002).

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4.30 Fish Species Occurring Upstream or Downstream from the San Joaquin River Restoration Program Area Attachment to Appendix K

Page 1-2, Table 1-2:

Table 1-2.
Fish Species Likely to Occur in the Impact Area Upstream or Downstream from the Restoration Area or in the Delta

Common name[1]	Scientific name	Status[2]		Native (N) Introduced (I)	Location[3 4]	Source
		Federal	State			
American shad	Alosa sapidissima			I	US, DE	BDAT 20085
Arrow goby	*Clevelandia ios*			I	DE	BDAT 20085
Bay pipefish (M)	*Syngnathus leptorhynchus*			N	DE	BDAT 20085
Bigscale logperch	*Percina macrolepida*			I	DE	BDAT 20085
Black bullhead	*Ameiurus melas*			I	DE, DS	BDAT 20085
Black crappie	*Pomoxis nigromaculatus*			I	DE, DS	BDAT 20085
Bluegill	*Lepomis macrochirus*			I	DE, DS	BDAT 20085
Brown bullhead	*Ameiurus nebulosus*			I	DE, DS	BDAT 20085
California halibut (M)	*Paralichthys californicus*			N	DE	BDAT 20085
Channel catfish	*Ictalurus punctatus*			I	DE, DS	BDAT 20085
Chinook salmon (unspecified)	*Oncorhynchus tshawytscha*			N	DE	BDAT 20085
Chinook salmon, Central Valley Spring-run	*Oncorhynchus tshawytscha*	FT	ST	N	DE, DS	USFWS 20084
Chinook salmon, Sacramento River winter-run	*Oncorhynchus tshawytscha*	FE	SE	N	DE, DS	USFWS 20084
Common carp	*Cyprinus carpio*			I	DE, DS	BDAT 20085
Delta smelt	*Hypomesus transpacificus*	FT	ST	N	DE, DS~~, US~~	CDFG 20086 BDAT 20085 USFWS 20084
Fathead minnow	*Pimephales promelas*			I	DE	BDAT 20085
Golden shiner	*Notemigonus crysoleucas*			I	DE	BDAT 20085
Goldfish	*Carassius auratus*			I	DE	BDAT 20085
North American green sturgeon—Southern DPS	*Acipenser medirostris*	FT	SSC	N	DE, DS	BDAT 20085 USFWS 2008
Green sunfish	*Lepomis cyanellus*			I	DE, DS	BDAT 20085
Hardhead	*Mylopharodon conocephalus*		SSC	N	~~DE~~ DS	BDAT 20085 USFWS 20084
Hitch	*Lavinia exilicauda*			N	DE, DS	BDAT 20085
Inland silverside	*Menidia beryllina*			I	DE	BDAT 20085
Jacksmelt (M)	*Atherinopsis californiensis*			N	DE	BDAT 20085

Table 1-2.
Fish Species Likely to Occur in the Impact Area Upstream or Downstream from the Restoration Area or in the Delta (contd.)

Common name[1]	Scientific name	Status[2]		Native (N) Introduced (I)	Location[3 4]	Source
		Federal	State			
Largemouth bass	*Micropterus salmoides*			I	DE, DS	BDAT 2008[5]
Longfin smelt	*Spirinchus thaleichthys*		SSC	N	DE	BDAT 2008[5]
Northern anchovy (M)	*Engraulis mordax*			N	DE	BDAT 2008[5]
Pacific herring (M)	*Clupea pallasii pallasii*			N	DE	BDAT 2008[5]
Pacific lamprey	*Lampetra tridentata*			N	DE, DS	BDAT 2008[5]
Pacific pompano (M)	*Peprilus simillimus*			N	DE	BDAT 2008[5]
Pacific staghorn sculpin	*Leptocottus armatus*			N	DE	BDAT 2008[5]
Pacific tomcod (M)	*Microgadus proximus*			N	DE	BDAT 2008[5]
Plainfin midshipman (M)	*Porichthys notatus*			N	DE	BDAT 2008[5]
Prickly sculpin	*Cottus asper*			N	DE, DS	BDAT 2008[5]
Rainbow trout	*Oncorhynchus mykiss*			N	DE, DS	BDAT 2008[5]
Rainwater killifish	*Lucania parva*			I	DE	BDAT 2008[5]
Redear sunfish	*Lepomis microlophus*			I	DE, DS	BDAT 2008[5]
River lamprey	*Lampetra ayresii*		SSC	N	DS	BDAT 2008[5]
Sacramento blackfish	*Orthodon microlepidotus*			N	DE	BDAT 2008[5]
Sacramento perch	*Archoplites interruptus*		SSC	N	DE	CDFG 2008[6] BDAT 2008[5]
Sacramento pikeminnow	*Ptychocheilus grandis*			N	DE, DS	BDAT 2008[5]
Sacramento splittail	*Pogonichthys macrolepidotus*		SSC	N	DE, DS	CDFG 2008[6] BDAT 2008[5]
Sacramento sucker	*Catostomus occidentalis*			N	DE, DS	BDAT 2008[5]
Shimofuri goby	*Tridentiger bifasciatus*			I	DE	BDAT 2008[5]
Shiner perch (M)	*Cymatogaster aggregata*			N	DE	BDAT 2008[5]
Shokihaze goby	*Tridentiger barbatus*			I	DE	BDAT 2008[5]
Speckled sanddab (M)	*Citharichthys stigmaeus*			N	DE	BDAT 2008[5]
Starry flounder (M)	*Platichthys stellatus*			N	DE	BDAT 2008[5]
Steelhead, Central Valley	*Oncorhynchus mykiss*	FT		N	DE, DS~~, US~~	USFWS 2008[4]
Striped bass	*Morone saxatilis*			I	DE, DS	BDAT 2008[5]
Surf smelt (M)	*Hypomesus pretiosus*			N	DE	BDAT 2008[5]
Threadfin shad	*Dorosoma petenense*			I	DE	BDAT 2008[5]
Threespine stickleback	*Gasterosteus aculeatus*			N	DE, DS	BDAT 2008[5]
Tidewater goby	*Eucyclogobius newberryi*	FE	SSC	N	DE	BDAT 2008[5]
Topsmelt (M)	*Atherinops affinis*			N	DE	BDAT 2008[5]

Table 1-2.
Fish Species Likely to Occur in the Impact Area Upstream or Downstream From the Restoration Area or in the Delta (contd.)

Common name[1]	Scientific name	Status[2]		Native (N) Introduced (I)	Location[3 4]	Source
		Federal	State			
Tule perch	*Hysterocarpus traskii*			N	DE, DS	BDAT 20085
Wakasagi	*Hypomesus nipponensis*			I	DE	BDAT 20085
Warmouth	*Lepomis gulosus*			I	DE, DS	BDAT 20085
Western mosquitofish	*Gambusia affinis*			I	DE	BDAT 20085
White catfish	*Ameiurus catus*			I	DE, DS	BDAT 20085
White crappie	*Pomoxis annularis*			I	DE, DS	BDAT 20085
White croaker (M)	*Genyonemus lineatus*			N	DE	BDAT 20085
White sturgeon	*Acipenser transmontanus*			N	DE, DS	BDAT 20085
Yellowfin goby	*Acanthogobius flavimanus*			I	DE	BDAT 20085

Notes:
[1] (M) = marine species
[2] FE = Federal endangered, FT = Federal threatened, SE = CA State endangered, ST = CA State threatened, SC = CA State candidate, SSC = CA species of special concern
[3] DS = mainstem San Joaquin River downstream of Restoration Area, US = mainstem San Joaquin River upstream of Restoration Area, DE = Delta
[4] Locations in italics indicate records returned from a USGS quad-based search of the USFWS species list (accessed online at: http://www.fws.gov/sacramento/es/spp_list.htm), and indicate species that may be affected by projects in the SJRRP Impact Area. These records are presented here to document results of special-status species searches. They do not necessarily represent a complete or accurate account of species occurrence.
[5] Data accessed through the Bay Delta and Tributaries (BDAT) Project website (http://bdat.ca.gov/) on February 21, 2008. Selected fisheries monitoring projects include: CDFG Fall Midwater Trawl, CDFG Summer Townet Survey, and UC Davis Suisun Marsh Fisheries Monitoring.
[6] Data accessed through the California Natural Diversity Database (2008). These records are based on reported current or historical occurrences. They do not necessarily represent a complete or accurate account of species occurrence.

4.31 Fish Species Occurring Upstream or Downstream from the San Joaquin River Restoration Program Area Attachment to Appendix K

Page 2-45, lines 27-31:

Review of the literature suggests that 5.5 to 12.8°C (42 to 55°F) is the optimum temperature range for incubating Chinook salmon (Donaldson 1955, Combs and Burrows 1957, Combs 1965, Eddy 1972~~, Bell 1973,~~ Healey 1979, Reiser and Bjornn 1979, Garling and Masterson 1985, Appendix E, Fisheries Management Plan).

4.32 Fish Species Water Temperature Suitability Attachment to Appendix K

Page 1, Table 1:

Table 1.
Suitable, Preferred, or Optimal-Water Temperature Ranges for
Special-Status Fish Species in the San Joaquin River from Friant Dam to the Delta

Species	Spawning	Incubation and Emergence	Larval and Juvenile Rearing	Adults	Sources	Comments
Chinook salmon	≤57 to 59°F [a] (upper limit suitable)	39 to 55°F [b,~~c~~] (suitable)	55 to 64°F [c~~d~~] (optimal)	≤66°F [a] (upper limit suitable)	[a] Williams (2006). [b] Myrick and Cech (2001) ~~[c] McCullough (1999)~~ [c~~d~~] Marine (1997), as cited in Moyle (2002)	Includes fall-, winter- and spring-run Chinook salmon runs.
Central Valley steelhead	39 to 52°F [a] (preferred)	48 to 52°F [a] (preferred)	63 to 66°F [b] (preferred)	46 to 52°F [a] (preferred)	[a] McEwan and Jackson (1996) [b] Myrick and Cech (2001)	Data are for Central Valley steelhead.
Sacramento splittail	<59°F [a] (upper limit suitable)	≤65°F [a,d] (upper limit suitable)	45 to 82°F [b] (suitable)	45 to 75°F [b, c] (suitable)	[a] Moyle et al. (2004). [b] Young and Cech (1996). [c] Moyle et al. (2002). [d] Bailey et al. (2000), as cited in Moyle (2002).	
Hardhead	59 to 64°F [a] (suitable)	nd	nd	75 to 82°F [b] (preferred)	[a] Wang (1986) [b] Knight (1985), as cited in Moyle (2002)	
Kern brook lamprey	50 to 68°F [a, b,d] (suitable)	nd	≤77°F [c] (upper limit preferred)	≤77°F [c] (upper limit preferred)	[a] Vladykov (1973), as cited in Moyle (2002). [b] Brumo (2006) [c] Vladykov and Kott (1976), as cited in Moyle (2002)	[d] No data available for spawning stage for this species. Data provided are for western brook lampreys.
River lamprey	54 to 64°F [a,b,e] (suitable)	54 to 68°F [c,d,f] (suitable)	nd	nd	[a] Beamish (1980) [b] Moyle (2002); upper end of range is for Pacific lamprey [c] Meeuwig et al. (2005) [d] Brumo (2006)	[e] Data on upper end of range is for Pacific lamprey . [f] Data are for Pacific lamprey

Notes for analysis:
Lethal upper temperature limits have not been identified for most of the analysis species. The impact analysis is based on the assumption that water temperatures exceeding the suitable or optimal range result in physiological stress, impairment of essential behavior (e.g., feeding), and mortality if sustained.
General definitions of temperature criteria categories used:
Suitable = The range of temperatures at which a given life stage has been documented occurring under natural conditions.
Preferred = The range that a given life stage most frequently inhabits when allowed to freely select temperatures in a thermal gradient.
Optimal = The optimum temperature range for normal feeding activity, physiological response, and behavior. Some values are specifically optimums for growth.
Key:
< = less than
≤ = less than or equal to
°F = degrees Fahrenheit
nd = no data

**Table 2.
Suitable, Preferred, or Optimal Water Temperature Ranges for
Game Fish Species in the San Joaquin River from Friant Dam to the Delta**

Species	Spawning	Incubation and Emergence	Larval and Juvenile Rearing	Adults	Sources	Comments
Rainbow trout	50 to 59°F [a] (preferred)	50 to 59°F [a] (suitable)	59 to 64°F [b] (optimal)	57 to 66°F [b] (optimal)	[a] Moyle (2002) [b] Myrick and Cech (2000)	Temperature range can vary with strain (Moyle 2002; Myrick and Cech 2000).
Largemouth bass	61 to 75°F [a] suitable	61 to 75°F [a,c] suitable	86 to 90°F [b] (preferred)	81°F [b] (preferred)	[a] Miller and Kramer (1971) as cited in Moyle (2002) [b] Coutant (1975), as cited in Moyle (2002)	[c] Based on spawning temperatures and short incubation time.
Smallmouth bass	55 to 61ºF [a] (lower limit suitable)	nd	84 to 88°F [b] (preferred)	68 to 81ºF [a] (preferred)	[a] Moyle (2002) [b] Coble (1975) as cited in Moyle (2002)	
Spotted bass	59 to 73 ºF[a] suitable	nd	nd	75 to 88ºF [b] (preferred)	[a] Aasen and Henry (1980~~1~~) ~~as cited in Moyle (2002)~~ [b] Williams and Burgess (1999) as cited in Moyle (2002)	
Striped bass	59 to 68°F (optimal)	59 to 68°F [a] (optimal)	≤77°F (upper limit suitable)	≤77°F (upper limit suitable)	Moyle (2002)	[a] Based on spawning temperatures and short incubation time.

Notes for analysis:
Lethal upper temperature limits have not been identified for most of the analysis species. The impact analysis is based on the assumption that water temperatures exceeding the suitable or optimal range result in physiological stress, impairment of essential behavior (e.g., feeding), and mortality if sustained.
General definitions of temperature criteria categories used:
Suitable = The range of temperatures at which a given life stage has been documented occurring under natural conditions.
Preferred = The range that a given life stage most frequently inhabits when allowed to freely select temperatures in a thermal gradient.
Optimal = The optimum temperature range for normal feeding activity, physiological response, and behavior. Some values are specifically optimums for growth.
Key:
< = less than
≤ = less than or equal to
°F = degrees Fahrenheit
nd = no data

Page 3:

Aasen, K.D., and F.D. Henry, Jr. 1980~~1~~. Spawning behavior and requirements of Alabama spotted bass, *Micropterus punctulatus henshalli*, in Lake Perris, Riverside County, California. California Fish and Game 67: 118–125.

Page 3:

~~McCullough, D.A. 1999. A review and synthesis of effects of alterations to the water temperature regime on freshwater life stages of salmonids, with special reference to Chinook salmon. EPA 910-R-99-010. Prepared for U.S. Environmental Protection Agency Region 10, Seattle, Washington.~~

Page 4:

———. 2001. Temperature effects on Chinook salmon and steelhead: a review focusing on California's Central Valley populations. Bay- Delta Modeling Forum, Technical Publication 01-1.

4.33 Species Life History Timing Attachment to Appendix K

Page 1, Table 1:

Table 1.
Temporal Occurrence of Each Life Stage of the Representative Fish Species in the San Joaquin River from Friant Dam to the Merced River. Presence in Restoration Area Reaches (1 through 5), if Known, is Indicated by Numbers in Each Cell

Life History Stage	Month																							
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Special-Status Species																								
Sacramento Splittail[1]																								
Adult instream migration	5	5																				5	5	5
Spawning			5	5	5	5	5	5	5	5	5	5												
Incubation and emergence				5	5	5	5	5	5	5	5	5	5											
Larval stage moving into deeper water				5	5	5	5	5	5	5	5	5	5	5										
Juvenile downstream migration							5	5	5	5	5	5	5	5	5	5								
Hardhead[2]																								
Adult migration						1	1	1	1	1	1	1	1	1	1									
Spawning							1	1	1	1	1	1	1	1	1	1								
Incubation and emergence	Not known																							
Larval stage	Larval and post larval fish remain in dense cover of flooded vegetation or fallen tree branches																							
Rearing or juveniles present	Move into deeper habitat																							

Table 1.
Temporal Occurrence of Each Life Stage of the Representative Fish Species in the San Joaquin River from Friant Dam to the Merced River. Presence in Restoration Area Reaches (1 through 5), if Known, is Indicated by Numbers in Each Cell (contd.)

Life History Stage	Month																							
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Kern Brook Lamprey[3]																								
Spawning					1	1	1	1																
Incubation and emergence	Not known																							
Larval stage	Not known																							
Rearing or juveniles present	Not known																							
Metamorphosis																			1	1	1	1		
Game Fish Species																								
Black Bass[3]																								
Spawning						1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5													
Incubation and emergence						1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5												
Larval stage						1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5												
Rearing or juveniles present							1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5										

Table 1.
Temporal Occurrence of Each Life Stage of the Representative Fish Species in the San Joaquin River from Friant Dam to the Merced River. Presence in Restoration Area Reaches (1 through 5), if Known, is Indicated by Numbers in Each Cell (contd.)

Life History Stage	Month																							
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Game Fish Species (contd.)																								
Striped Bass[3]																								
Adult migration						1,2, 3,5	1,2, 3,5	1,2, 3,5	1,2, 3,5															
Spawning							2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5												
Incubation and emergence							2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5												
Larval stage							2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5	2,3, 5												
Rearing or juveniles present	Juveniles quickly migrate downstream to estuary.																							
Rainbow Trout[4]																								
Spawning	1	1	1	1	1	1	1	1																
Incubation and emergence	1	1	1	1	1	1	1	1	1	1	1	1												
Larval stage	Fry live in quiet waters before they move into deeper, faster flowing waters																							
Rearing or juveniles present					1	1	1	1	1	1	1	1	1	1										

Sources:
Reach Locations from: CDFG (2007) and McBain and Trush (2002).
[1] *Moyle et al. (2004)*
[2] *Grant and Maslin (1997), as cited in Moyle (2002)*
[3] *Moyle (2002)*
[4] *Moyle (2002), McEwan (2001)*

Probable span of life history activity	(light shading)
Peak of life history activity	(dark shading)

4.34 Black Bass Spawning Production Model Description Attachment to Appendix K

Page 1-1, Lines 12-13:

spawning depths, which are deeper for spotted bass (Greene and Maceina 2000, ~~Reinart et. al. 1995,~~ Aasen and Henry 1980~~, Vogele 1975~~). Therefore, except for spawning

Page 1-3, Line 15:

from spawning habitat analyses reported in ~~Jones and Stokes (1995)~~ and Mitchell

Page 2-1:

~~Jones and Stokes Associates. 1995. Fisheries Study of the Increased Use of the Existing Russian River Projects Alternative for the Sonoma County Water Agency Water Supply and Transmission System Project. Prepared for Sonoma County Water Agency. Sacramento, California.~~

Page 2-1:

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~~Vogele, L.E. 1975. Reproduction of Spotted Bass, *Micropterus punctulatus*, in Bull Shoals Reservoir, Arkansas. US Fish and Wildlife Service Technical Paper 84. 21 pp.~~

4.35 Special Status Species Tables Attachment to Appendix L

Pages 8-18, Table 2:

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Invertebrates				
Conservancy fairy shrimp	*Branchinecta conservatio*	USFWS: endangered Designated critical habitat	Vernal pools and swales	Known to occur in suitable habitat on the San Luis National Wildlife Refuge (NWR) complex in Reaches 4B2 and 5 and Eastside Bypass
Longhorn fairy shrimp	*Branchinecta longiantenna*	USFWS: endangered Designated critical habitat	Vernal pools and swales	Known to occur in suitable habitat on the San Luis NWR complex in Reach 5
Vernal pool fairy shrimp	*Branchinecta lynchi*	USFWS: threatened Designated critical habitat	Vernal pools and other seasonal wetlands	Known to occur in suitable habitat on the San Luis NWR complex in Reaches 4B1, 4B2, and 5, and Chowchilla and Eastside bypasses
Vernal pool tadpole shrimp	*Lepidurus packardi*	USFWS: endangered Designated critical habitat	Vernal pools, swales, and other ephemeral wetlands	Known to occur in suitable habitat on the San Luis NWR complex and at the Great Valley Grasslands State Park in Reaches 4B1, 4B2, and 5, and Chowchilla and Eastside bypasses
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	USFWS: threatened	Elderberry shrubs, typically in riparian habitats	Known to occur in elderberry shrubs present in the riparian woodland in Reach 1A; expected to occur in suitable habitat in other locations in the Restoration Area

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Amphibians				
California tiger salamander	*Ambystoma californiense*	USFWS: threatened Designated critical habitat CA: species of special concern	Small ponds, lakes, or vernal pools in grasslands or oak woodlands	Known to occur in suitable habitat on the San Luis NWR complex and at the Great Valley Grasslands State Park in Reaches 4B1, 4B2, and 5, and Chowchilla Bypass; other occurrences reported adjacent to Restoration Area in Reach 1A
Western spadefoot	*Spea hammondii*	CA: species of special concern	Vernal pools and seasonal wetlands in upland with burrows and other belowground refuge	Known to occur in suitable habitat on the San Luis NWR complex and at the Great Valley Grasslands State Park in Reaches 4B1, 4B2, and 5; other occurrences reported adjacent to Restoration Area in Reach 1A
California red-legged frog	*Rana aurora draytonii*	USFWS: threatened CA: species of special concern	Aquatic habitats, such as creeks, streams, and ponds	Unlikely to occur; no longer occurs on the floor of the Central Valley
Reptiles				
Western pond turtle	*Actinemys marmorata marmorata*	CA: species of special concern	Ponds, marshes, rivers, streams, sloughs; nests in nearby uplands with suitable soils	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 Restoration Area
Blunt-nosed leopard lizard	*Gambelia sila*	USFWS: endangered CA: endangered, fully protected	Open habitats with scattered low bushes on alkali flats, plains, washes, and arroyos	Known to occur in Chowchilla Bypass and adjacent to Reach 3

**Table 2.
Special-Status Wildlife Species Known or
with Potential to Occur in the San Joaquin River Restoration Area (contd.)**

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
California horned lizard	*Phrynosoma coronatum frontale*	CA: species of special concern	Grasslands, brushlands, woodlands, and open coniferous forests	Could occur in suitable habitat
Silvery legless lizard	*Anniella pulchra pulchra*	CA: species of special concern	Loose soil or thick leaf litter in chaparral, woodland, and riparian areas	Known to occur in suitable habitat on the San Luis NWR complex and near the confluence of Willow Slough
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	CA: species of special concern	Open, dry vegetation in valley grasslands and saltbush scrub	Could occur; suitable habitat present in Restoration Area
Giant garter snake	*Thamnophis gigas*	USFWS: threatened CA: threatened	Streams, sloughs, ponds, and irrigation/drainage ditches; also requires upland refugia not subject to flooding during its inactive season	Known to occur in suitable habitat on the San Luis NWR complex and in the Mendota Wildlife Area; reported from Mendota Pool; expected to occur in suitable habitat in other locations in the Restoration Area
Birds				
Redhead	*Aythya americana*	CA: species of special concern	Nests in freshwater emergent wetlands with dense patches of tules or cattails interspersed with areas of deep, open water; forages in open water	Uncommon but regular breeder in Central Valley; known to nest at Mendota Pool and also occurs at the San Luis NWR and Mendota Wildlife Area; expected in the Restoration Area
American white pelican	*Pelecanus erythrorhynchos*	CA: species of special concern	Nests in protected inland wetlands; forages in shallow inland waters, including marshes and along lakes or rivers and in shallow coastal marine areas	Common in winter throughout Central Valley; expected in the Restoration Area
Least bittern	*Ixobrychus exilis*	CA: species of special concern	Nests in dense emergent vegetation in fresh and brackish marsh	Uncommon but regular breeder in suitable habitat in the San Joaquin Valley; expected in the Restoration Area

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Double-crested cormorant (rookery)	*Phalacrocorax auritus*	CA: watch list	Forages in inland ponds and lakes; nests in riparian forests	Known to occur in suitable habitat on the San Luis NWR complex; known along Reach 1A at DFG's Milburn Ecological Reserve
Great blue heron (rookery)	*Ardea herodias*	CA: CNDDB tracked	Colonial nester in tall trees, cliff sides, and sequestered spots on marshes; common over most of North America	Rookeries known to occur at base of Friant Dam, Milburn and Rank Island Ecological Reserves in Reach 1A
Great egret (rookery)	*Ardea alba*	CA: CNDDB tracked	Nests in colonies with other species, in shrubs and trees over water, and on islands; feeds in variety of wetlands, including marshes, swamps, streams, rivers, ponds, lakes, tide flats, canals, and flooded fields	Rookeries known to occur at base of Friant Dam, Milburn and Rank Island Ecological Reserves in Reach 1A
White-faced ibis (rookery)	*Plegadis chihi*	CA: species of special concern	Freshwater marshes with tules, rushes, and cattails, and flooded agricultural fields	Known to occur in suitable habitat on the San Luis NWR complex and other sites in the Restoration Area
Cackling (Aleutian) Canada goose	*Branta hutchinsii leucopareia*	USFWS: delisted CA: CNDDB tracked	Nests in the Aleutian Islands, winters in the Central Valley south to Merced	Known to winter in suitable habitat on the San Luis NWR complex and other suitable sites in the Restoration Area
Cooper's hawk	*Accipiter cooperii*	CA: watch list	Nests primarily in deciduous riparian forests; may also occupy dense canopied forests from gray pine-oak woodland to ponderosa pine; forages in open woodlands	Potential nesting habitat present in Restoration Area; known to occur in suitable habitat in the San Joaquin Valley

**Table 2.
Special-Status Wildlife Species Known or
with Potential to Occur in the San Joaquin River Restoration Area (contd.)**

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Sharp-shinned hawk	*Accipiter striatus*	CA: watch list	Dense to open canopy pine or mixed conifer forest, riparian habitats, and grassland with scattered trees; permanent resident in parts of the Sierra Nevada, Cascade, Klamath, and North Coast Ranges; usually nests in conifers	Potential foraging and wintering habitat is present in Restoration Area
Golden eagle (nesting and wintering)	*Aquila chrysaetos*	CA: watch list and fully protected species	Nests on cliff faces with suitable ledges or in large trees in open areas; forages over open terrain	Uncommon winter visitor throughout the Central Valley; known to occur in suitable habitat on the San Luis NWR complex and other areas along the San Joaquin River
Ferruginous hawk (wintering)	*Buteo regalis*	CA: species of special concern	Forages in open grasslands and agricultural fields	Known to occur during winter in suitable habitat on the San Luis NWR complex
Swainson's hawk (nesting)	*Buteo swainsoni*	CA: threatened	Forages in grasslands and agricultural fields; nests in open woodland or scattered trees	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
Northern harrier (nesting)	*Circus cyaneus*	CA: species of special concern	Forages and nests in grassland, agricultural fields, and marshes	Known to occur in suitable habitat on the San Luis NWR complex and other areas along the San Joaquin River
White-tailed kite (nesting)	*Elanus leucurus*	CA: fully protected species	Forages in grasslands and agricultural fields; nests in isolated trees or small woodland patches	Known to occur in suitable habitat in Lost Lake Park; expected to occur in suitable habitat in Restoration Area
Bald eagle (nesting and wintering)	*Haliaeetus leucocephalus*	USFWS: delisted CA: endangered and fully protected	Forages along inland waters; nests in adjacent large, old-growth trees or snags	Known to nest in suitable habitat on Lake Millerton and Chowchilla Bypass and occurs during winter and migration in the San Luis NWR complex

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Merlin (wintering)	*Falco columbarius*	CA: watch list	Forages in open woodlands, savannas, edges of grasslands and deserts, farms, and ranches	Known to occur in suitable habitat on the San Luis NWR complex
Prairie falcon	*Falco mexicanus*	CA: watch list and fully protected species	Nests on cliffs overlooking a large, open area; forages in open habitats	Uncommon visitor in suitable habitat in the Study Area; expected in the Restoration Area
American peregrine falcon	*Falco peregrinus anatum*	USFWS: delisted CA: endangered and fully protected	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes; permanent resident in the north and south Coast Ranges; winters in the Central Valley southward through the Transverse and Peninsular ranges; feeds almost exclusively on birds	Known to occur at the San Luis NWR; expected to occur in suitable habitat in Restoration Area
Lesser sandhill crane (wintering)	*Grus canadensis canadensis*	CA: species of special concern	Forages in grasslands, pastures, and agricultural fields (particularly recently disturbed grain fields); roosts in a variety of wetlands with shallow water depths	Known to winter at the Merced NWR; expected to occur in suitable habitat in Restoration Area
Greater sandhill crane (nesting and wintering)	*Grus canadensis tabida*	CA: threatened, fully protected species	Shallow lakes and freshwater marshes	Known to occur during winter in suitable habitat on the San Luis NWR complex and along the San Joaquin River; no nesting habitat
Mountain plover (wintering)	*Charadrius montanus*	CA: species of special concern	Open plains or rolling hills with short grasses or sparse vegetation	Known to occur in winter in suitable habitat near Tranquility

**Table 2.
Special-Status Wildlife Species Known or
with Potential to Occur in the San Joaquin River Restoration Area (contd.)**

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Long-billed curlew	*Numenius americanus*	CA: watch list	Nests in open grassland in the prairie region and far northeastern California; winters in range of wetland habitats, foraging in pastures, agricultural fields, and tidal estuaries	Common winter resident in the Central Valley in wet habitats, including San Luis NWR; expected in the Restoration Area
Black tern	*Chlidonias niger*	CA: species of special concern	Nests semicolonially in protected marshes and rice fields; forages on fish and insects	Uncommon visitor in suitable habitat in the Study Area, including San Luis NWR; expected during the nonbreeding season in the Restoration Area
Western yellow-billed cuckoo (nesting)	*Coccyzus americanus occidentalis*	USFWS: candidate CA: endangered	Inhabits wide, dense riparian forests with a thick understory of willows for nesting; prefers sites with a dominant cottonwood overstory for foraging	~~Known to nest in suitable habitat in Restoration Area~~ No recent nesting records, but potential nesting habitat present.
Short-eared owl (nesting)	*Asio flammeus*	CA: species of special concern	Tall (ungrazed) grasslands and marshes with dense vegetation	Known to occur in suitable habitat on the San Luis NWR complex, where it possibly also nests
Burrowing owl (burrow sites)	*Athene cunicularia hypugea*	CA: species of special concern	Grasslands and agricultural fields	Known to occur in suitable habitat along Chowchilla Bypass and on the San Luis NWR complex and at Mendota Pool
Loggerhead shrike (nesting)	*Lanius ludovidianus*	CA: species of special concern	Forages in grasslands and agricultural fields; nests in scattered shrubs and trees	Known to nest in suitable habitat on the San Luis NWR complex; expected to nest in other suitable habitat

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Willow flycatcher	*Empidonax traillii*	USFWS: endangered (*E. t. iextimus*) CA: endangered	Riparian habitats and large wet meadows with abundant willows during migration	Known as rare spring and uncommon fall migrants in riparian habitats of the San Luis and West Bear Creek units of the San Luis NWR
Least Bell's vireo (nesting)	*Vireo bellii pusillus*	USFWS: endangered CA: endangered	Cottonwood-willow forest, oak woodland, shrubby thickets, and dry washes with willow thickets	Known to nest in suitable habitat on the San Joaquin River NWR in the San Luis NWR complex
California horned lark	*Eremophila alpestris actia*	CA: watch list	Grasslands and agricultural areas, especially sparsely vegetated or barren areas	Known to nest in suitable habitat on the San Luis NWR complex
Bank swallow (nesting)	*Riparia riparia*	CA: threatened	Forages in various habitats; nests in banks or bluffs, typically adjacent to water	~~Known to nest in suitable habitat near Mendota Pool~~No recent nesting records, but potential nesting habitat present.
Yellow warbler (nesting)	*Dendroica petechia brewsteri*	CA: species of special concern	Riparian woodlands.	No recent nesting records, but potential nesting habitat present; known to occur during migration in suitable habitat on the San Luis NWR complex and other sites in the Restoration Area
Yellow-breasted chat (nesting)	*Icteria virens*	CA: species of special concern	Dense riparian thickets of willows, vine tangles, and dense brush associated with streams, swampy ground and the borders of small ponds	Potential nesting habitat present in Restoration Area; known to occur during migration in suitable habitat in the San Joaquin Valley
Grasshopper sparrow (nesting)	*Ammodramus savannarum*	CA: species of special concern	Grassland, especially moderately open grassland with scattered shrubs	Known to breed in the Los Banos Wildlife Area, the North Grasslands Wildlife Area, the San Luis NWR complex, and the Mendota Wildlife Area

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Tricolored blackbird (nesting colony)	*Agelaius tricolor*	CA: species of special concern	Forages in grasslands and agricultural fields; nests in freshwater marsh, riparian scrub, and other dense shrubs and herbs	Known to occur in suitable habitat on the San Luis NWR complex and other sites in the Restoration Area
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	CA: species of special concern	Nests in freshwater emergent wetlands with dense vegetation and deep water, often along borders of lakes or ponds; its range extends as far west as central-interior British Columbia, moving directly south through the central-interior west coast to northeastern Baja California	Known to occur in suitable habitat throughout San Joaquin Valley, including the San Luis NWR complex; potential nesting habitat present in Restoration Area
Mammals				
Pallid bat (roosting)	*Antrozous pallidus*	CA: species of special concern	Deserts, grasslands, shrublands, woodlands, and forests; most common in open, dry habitats with rocky areas for roosting	Could occur in the Restoration Area, but highly associated with oak woodlands in the Central Valley
Townsend's big-eared bat	*Corynorhinus townsendii*	CA: species of special concern	Forages along edges of a variety of habitats; roosts in caves, tunnels, mines, trees, and buildings	No records known from the Restoration Area, although could occur in suitable habitat
Spotted bat	*Euderma maculatum*	CA: species of special concern	Shrub-steppe grasslands	Known to occur near Friant Dam

**Table 2.
Special-Status Wildlife Species Known or
with Potential to Occur in the San Joaquin River Restoration Area (contd.)**

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Western red bat	*Lasiurus blossevillii*	CA: species of special concern	From Shasta County south to Mexico, west of the Sierra Nevada/Cascade crest and deserts; the winter range includes western lowlands and coastal regions south of San Francisco Bay; roosting habitat includes forests and woodlands from sea level up through mixed conifer forests	Known to occur in Restoration Area along Reach 3, north of Mendota Wildlife Area
Hoary bat	*Lasiurus cinereus*	CA: CNDDB tracked	Prefers woodlands and coniferous forests, but hunts over open areas and lakes; noncolonial	Could occur in the Restoration Area, roosting in riparian trees and foraging over open water and in open woodland habitats
Yuma myotis	*Myotis yumanensis*	CA: CNDDB tracked	Roosts colonially in caves, tunnels, trees, and buildings; inhabits arid regions; distributed throughout the western United States, Mexico, and Canada	Known to occur in Restoration Area along Reach 3, north of Mendota Wildlife Area
Western mastiff bat (roosting)	*Eumops perotis californicus*	CA: species of special concern	Crevices on cliffs faces, boulders, and buildings, usually with space for at least a 10-foot vertical drop	Known to occur in suitable habitat in the San Joaquin Valley
Riparian brush rabbit	*Sylvilagus bachmani riparius*	USFWS: endangered CA: endangered	Dense thickets of brush associated with riparian or chaparral habitats	No records known from the Restoration Area, although could occur in suitable habitat; recently reintroduced on private land adjacent to the San Joaquin River NWR

Table 2.
Special-Status Wildlife Species Known or with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Nelson's antelope squirrel	*Ammospermophilus nelsoni*	CA: threatened	Arid grasslands with loamy soils and moderate shrub cover	Could occur if suitable habitat is present in Restoration Area; reported south of Mendota Pool
Giant kangaroo rat	*Dipodomys ingens*	USFWS: endangered CA: endangered	Annual grasslands and shrubland habitats with sparse vegetative cover	Unlikely to occur in the Restoration Area; although historically known from the region, now known to occur only in the Kettleman Hills in Kings County and western Kern County
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	USFWS: endangered Designated critical habitat CA: endangered	Alkali desert scrub habitats between 200 and 300 feet elevation	Known to occur in suitable habitat at the Alkali Sink Ecological Reserve and Mendota Wildlife Area near the Restoration Area, although may be extirpated along the San Joaquin River
San Joaquin pocket mouse	*Perognathus inornatus inornatus*	CA: CNDDB tracked	Inhabits grassland and scrub habitats in Central and San Joaquin valleys; associated with friable soils	Known to occur in suitable habitat in and in the immediate vicinity of the Restoration Area
San Joaquin (riparian) woodrat	*Neotoma fuscipes riparia*	USFWS: endangered CA: species of special concern	Riparian forests	No records known from the Restoration Area, although could occur in suitable habitat
San Joaquin kit fox	*Vulpes macrotis mutica*	USFWS: endangered CA: threatened	Saltbush scrub, grasslands, oak savannas, and freshwater scrub	Known to occur in suitable habitat on the San Luis NWR complex and other sites in the Restoration area

Table 2.
Special-Status Wildlife Species Known or
with Potential to Occur in the San Joaquin River Restoration Area (contd.)

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Ringtail	*Bassariscus astutus*	CDFG: fully protected	Wooded and brushy areas, especially near water courses	Could occur in the Restoration Area; species distribution not well known; unlikely to occur on the valley floor, but could occur in Reach 1
American badger	*Taxidea taxus*	CA: species of special concern	Scrub habitats	Known to occur in suitable habitat in the San Joaquin Valley; reported from Reaches 4B2 and 5

Sources: CNDDB 2007, USFWS 2007
Key:
CA = California
CDFG = California Department of Fish and Game
CNDDB = California National Diversity Database
DWR = California Department of Water Resources
NWR = National Wildlife Refuge
USFWS = U.S. Fish and Wildlife Service

4.36 Species Accounts Attachment to Appendix L

Page 3-15, Lines 2-3:

Joaquin Valley (Stebbins 1954; Montanucci 1965; USFWS 1980, 1985a; Germano and Williams 1992~~3~~). These activities present ongoing threats to the survival of blunt-nosed

Page 3-47, Lines 5-14:

The yellow-breasted chat winters from Baja California and south Texas to central Guatemala (Comrack 2008). Its breeding range extends from British Columbia to North Dakota and south to Baja California and west Texas. Historically, the yellow-breasted chat bred throughout much of California (below 5,000 feet) and almost all of the Central Valley (Comrack 2008). Currently, it breeds in only a small portion of the Sacramento Valley, and is not known to nest~~very few locations~~ in the San Joaquin Valley. It is associated with dense riparian thickets of willows, vine tangles, and dense brush associated with streams, swampy ground, and the borders of small ponds.

Potential nesting habitat for this species is present in the Restoration Area. It is also known to occur during migration in suitable habitat in the San Joaquin Valley.

Page 3-51, Line 19:

bat is considered to be uncommon and declining (~~Pierson 1988,~~ Pierson and Rainey 1996,

Page 4-5, Line 20:

Germano, D. J., and D. F. Williams. 1992~~3~~. Recovery of the Blunt-Nosed Leopard Lizard: Past Efforts, Present Knowledge, and Future Opportunities. *Transactions of the Western Section of The Wildlife Society* 28:38–47.

Page 4-12, Lines 27-29:

~~Pierson, E. D. 1988. *The Status of Townsend's Big-Eared Bats in California: Preliminary Results 1987–1988*. Unpublished progress report. Wildlife Management Division, California Department of Fish and Game. Sacramento, California.~~

Page 4-17, Lines 12-15:

———. 2001 (September). *Wildland Fire Management Plan for San Luis National Wildlife Refuge Complex*. Available: <http://www.fws.gov/fire/fmp/region8/california/san_luis_nwr_complex.pdf~~><http://www.fws.gov/fire/fmp/operations/california/san_luis_nwr_complex>~~. Accessed January 15, 2009.

Page 4-17, Lines 36-38:

———. 2007c. Species Account, San Joaquin Kit Fox, *Vulpes macrotis mutica*. Available: <http://www.fws.gov/sacramento/es_species/Accounts/Mammals/Documents/sj_kit_fox.pdf> ~~<http://www.fws.gov/sacramento/es/animal_spp_acct/sj_kit_fox.pdf>~~. Accessed January 24, 2009.

4.37 Invasive Vegetation Monitoring and Management Plan Attachment to Appendix L

Page 2-1, lines 4–7:

nonnative invasive plants. The purpose of the monitoring is to determine whether, as a result of Settlement actions, invasive species have spread to areas that previously were not infested with nonnative invasive plants, to assess the effectiveness of control measures, and to help guide new control efforts. Invasive nonnative riparian plants have the potential to compromise

Page 2-1, lines 12–15:

Data on invasive plants will be collected concurrently with the collection of native vegetation establishment data described ~~above~~ in ~~Section 3~~Appendix D, “Physical Monitoring and Management Plan.”~~.~~ However, because these data are only collected at ~~six sites only~~ several sites, surveys for ~~seedlings of~~ invasive plants will also be conducted.

Page 2-2, lines 16–17:

Monitoring of native vegetation establishment and other vegetation monitoring conducted by the Physical Monitoring and Management Plan (see Appendix D) will incorporate monitoring of invasives as described above in Section 2.2, Methods. ~~Locations and frequencies of the native vegetation establishment monitoring (where invasives will also be monitored) have been described in Table 1.~~

Page 2-2, lines 27–29:

the next growing season. New infestations of other invasive plants will be addressed when they appear to become a significant threat to the successful implementation of the ~~SJRRP~~Settlement, including implementation of the Physical Monitoring and Management Plan (see Appendix D) and of the Riparian Habitat Monitoring and Mitigation Plan to be developed in coordination with DFG (see RHSNC-2 in Table 2-7 of the Draft PEIS/R). Control measures also may be applied to existing infestations of priority species and other invasive plant species to eliminate sources of new infestations or to support channel and native vegetation management actions (see Section 4.2, Potential Channel Management Actions, and Section, 5.2 Potential Native Vegetation Management Actions, respectively, of Appendix D).

Page 2-2, lines 31–35:

Management responses will be species-specific and will also depend on the size of the plants and of the infestation, and will include mechanical and chemical treatment of infestations. ~~These methods have been described in the "Management Measures" chapters of this Vegetation Management Plan. For example, m~~Measures of the four highest priority species include a combination of mechanical and chemical treatment. In all cases,

Page 2-3, after line 11:

Other management responses could be applied to priority or other invasive species if necessary for successful implementation of the Settlement (including the Physical Monitoring and Management Plan and the Riparian Habitat Monitoring and Mitigation Plan) and consistent with requirements of applicable regulations and site-specific environmental documents, available funding, and other constraints

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Chapter 5.0 References

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DBW. *See* California Department of Boating and Waterways.

DFG. *See* California Department of Fish and Game.

DOI. *See* U.S. Department of the Interior.

DWR. *See* California Department of Water Resources.

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Lead CEQA Agency: California Department of Water Resources			
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John Hunter	Ph.D., Plant Science; 26 years experience	Conservation Planning and Ecological Research; NEPA/CEQA Compliance	Biological Resources – Vegetation and Wildlife Land Use Planning and Agricultural Resources, Conservation Strategy
Jenifer King	B.S., Wildlife Biology; 17 years experience	Environmental Planning	Utilities and Public Services, Land Use Planning and Agricultural Resources, Visual Resources
Wendy Copeland	M.A., Plant Pathology; 13 years experience	Environmental Sciences, Environmental Planning	Paleontological Resources
Kelly Fitzgerald-Holland	M.S., Environmental Science; 13 years experience	Wildlife Biology and ESA Compliance	Biological Resources – Vegetation and Wildlife, Conservation Strategy
Stephen Weidlich	M.S., Anthropology; 9 years experience	Environmental Justice and Socioeconomic Analyses	Socioeconomics, Environmental Justice

Name	Qualifications	Background/Expertise	Participation
Consultant: AECOM (contd.)			
Michael Downs	Ph.D., Anthropology; 32 years experience	Socioeconomic and Social Impact Analysis	Socioeconomics, Environmental Justice
Jim Vogel	Ph.D., Natural Resource Recreation and Tourism; 24 years experience	Outdoor Recreation Research and Planning	Recreation
Jake Weirich	B.S., Sound Engineering; 7 years experience	Air Quality, Climate Change, and Noise	Air Quality, Climate Change
Whitney Leeman	Ph.D., Civil/Environmental Engineering; 12 years experience	Air Quality and Climate Change	Air Quality, Climate Change
Andrew Bayne	B.A., Health and Human Performance; 6 years experience	Environmental Planning	Transportation and Traffic, Noise