Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

RECORD OF DECISION

SAN JOAQUIN RIVER RESTORATION PROGRAM

SEP 28 2012

ATTACHMENTS

ATTACHMENT A – PROJECT DESCRIPTION

ATTACHMENT B –ENVIRONMENTAL COMMITMENT PLAN AND TRACKING PROGRAM

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ATTACHMENT A:
ALTERNATIVE C1 PROJECT DESCRIPTION

This attachment includes the project description from the Program Environmental Impact Statement/Report (PEIS/R) for Alternative C1, the Preferred Alternative. Alternative C1 implements the Stipulation of Settlement in *NRDC, et al., v. Rodgers, et al.* (Settlement) consistent with the authorizing legislation in the San Joaquin River Restoration Settlement Act (Act; Public Law 111-11).

Alternative C1 includes both project and program level actions. The following description includes a subsection describing the project-level actions included in Alternative C1, and a subsection describing program-level actions included in Alternative C1. Two additional subsections describe the Physical Monitoring and Management Plan and the Conservation Strategy, which include both project- and program-level actions intended to guide implementation of the Settlement. The Restoration Area and specific river reaches referenced in this attachment are shown in Figure 1-1 and 1-2 of the Draft PEIS/R.

1.1 Project-Level Actions

Project level actions included in Alternative C1 are described in greater detail below. The Physical Monitoring and Management Plan (Appendix D of the Draft PEIS/R) and the Conservation Strategy (Table 4), which includes both project- and program-level actions, are described in separate subsections.

Project level actions described in more detail below are as follows:

- **Operate Friant Dam and Downstream Flow Control Structures –** Actions for reoperating Friant Dam and downstream flow control structures for the release and conveyance of Interim and Restoration flows include the following:
  - Releasing Interim and Restoration flows from Friant Dam up to the Restoration Flows stipulated by the Settlement, as constrained by then-existing channel capacities
  - Minimizing increases in flood risk in the Restoration Area as a result of Interim and Restoration flows
  - Reoperating downstream flow control structures, which includes modifying operations of the San Joaquin River Flood Control Project (flood management system) and other structures to convey Interim and Restoration flows
  - Establishing an Recovered Water Account (RWA) and managing Friant Dam to make water supplies available to Friant Division long-term contractors at a preestablished rate

- **Recapture Interim and Restoration Flows –** Alternative C1 includes actions to recapture Interim and Restoration flows within the Restoration Area and/or the Sacramento-San Joaquin Delta (Delta) using existing facilities, as shown in Figure 1. Actions to recapture Interim and Restoration flows in the Restoration Area, and Interim and Restoration Flows in the Delta, are constrained by established regulatory and institutional conditions, with no new facility construction, facility modifications, or agreements. Recaptured water available for transfer to Friant Division long-term contractors under all action alternatives would range from zero to 556 thousand acre-feet (TAF), as shown in Table 1. Project-level actions to recapture Interim and Restoration flows under Alternative C1 include the following:

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

  – Recapture of Interim and Restoration flows in the Delta at existing Central Valley Project (CVP)/State Water Project (SWP) facilities

Additional recapture actions are described in Section 1.2, Program-level Actions below.

The following sections describe these project-level actions in greater detail.

Reoperate Friant Dam and Downstream Flow Control Structures

Reoperation of Friant Dam and downstream control structures includes the release of Interim and Restoration flows, reoperating downstream flow control structures, and establishing a RWA, as stipulated by the Settlement and described in the following sections.

Release Interim and Restoration Flows. Operations at Friant Dam would change to release Interim and Restoration flows to the San Joaquin River, according to the six flow schedules specified in Exhibit B of the Settlement, as shown in Figure 2. The flow schedules are specified in Exhibit B of the Settlement according to six year types: Critical-Low, Critical-High, Dry, Normal-Dry, Normal-Wet, and Wet. The total annual unimpaired runoff at Friant Dam for a water year is the index by which the water year type is determined (based on water years 1922 through 2004). The Settlement includes an annual allocation of Interim and Restoration flows using either the Restoration Flow schedules included in Exhibit B of the Settlement, or a more continuous hydrograph, as shown in Figure 3, in consideration of recommendations to be made by the Restoration Administrator (RA). Potential alternate pathways for the transformation of allocated Restoration Flows between flow schedules are described in Appendix G of the Draft PEIS/R, "Plan Formulation." Table 2 contains the Settlement-recommended release schedule for Interim and Restoration flows.

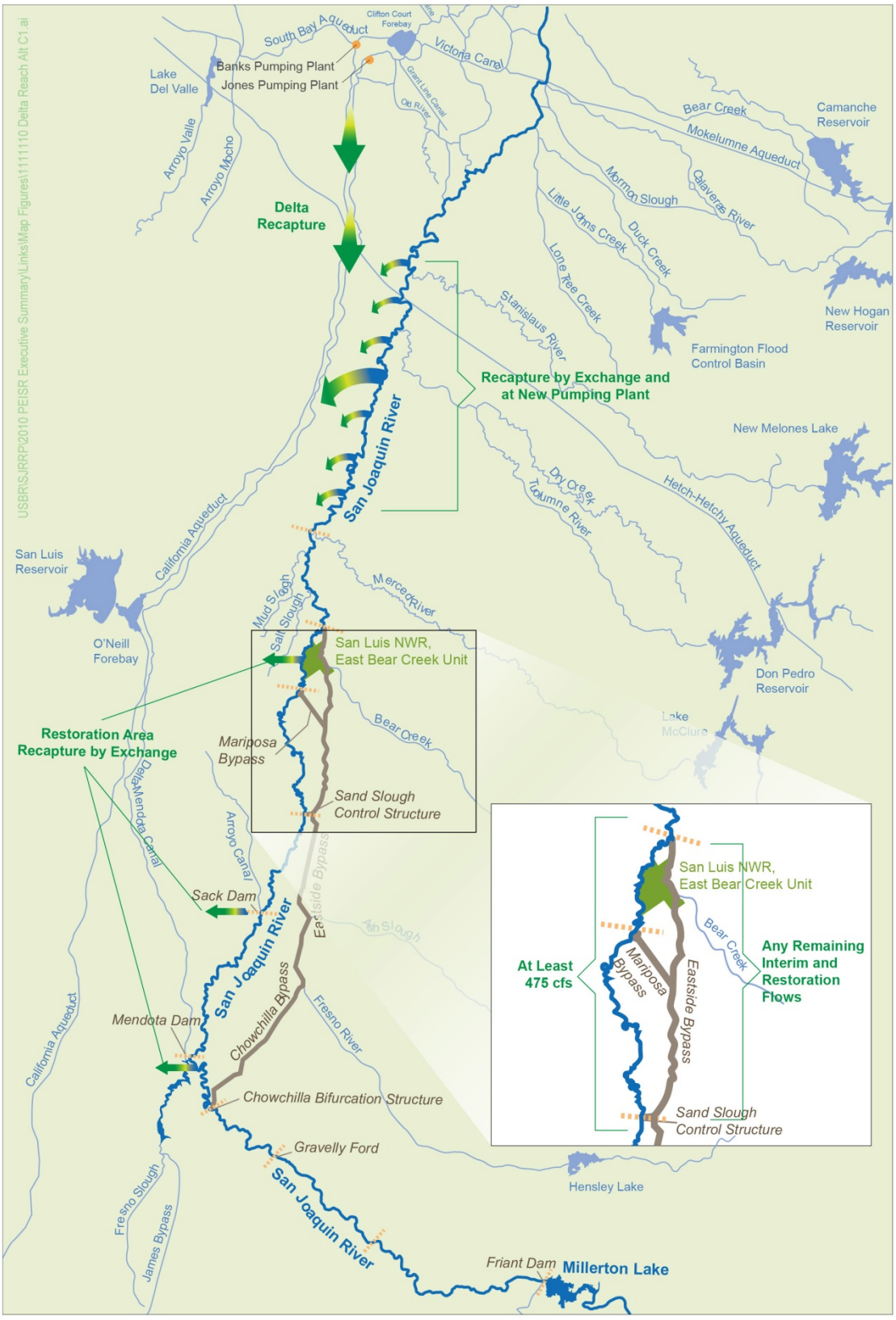


Figure 1.
Flow Routing and Water Recapture Under Alternative C1

Table 1.
Estimated Maximum Water Available for Transfer Under Alternative C1

Begin Date	End Date	Friant Dam Releases According to Settlement		Reach 1 Holding Contract Diversions Estimated as in Exhibit B1	Friant Dam Releases Eligible for Recapture[1]	
		(cfs)	(TAF)	(cfs)	(cfs)	(TAF)
10/1	10/31	350	22	160	190	12
11/1	11/10	700	14	130	570	11
11/11	12/31	350	35	120	230	23
1/1	2/28	350	41	100	250	29
3/1	3/15	500	14	130	370	10
3/16	3/31	1,500	48	130	1,370	43
4/1	4/15	2,500	74	150	2,350	70
4/16	4/30	4,000	119	150	3,850	115
5/1	6/30	2,000	242	190	1,810	219
7/1	8/31	350	43	230	120	15
9/1	9/30	350	21	210	140	8
Total flows released (TAF)			**673**	**Total available for transfer[2] (TAF)**		**556**
Potential buffer flows (TAF)			67	Potential buffer flows (TAF)		67
Potential additional releases pursuant to Paragraph 13(c)			100	Potential additional releases pursuant to Paragraph 13(c), minus seepage[3]		0
Maximum total volume released (TAF)			**840**	**Maximum total volume available for transfer (TAF)**		**623**

Notes:

[1] 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, as provided in Exhibit B of the Settlement. Water delivered to riparian water right holders would not be eligible for recapture.

[2] Total eligible for recapture is a maximum potential total, and does not account for anticipated losses to seepage or other unanticipated losses.

[3] 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

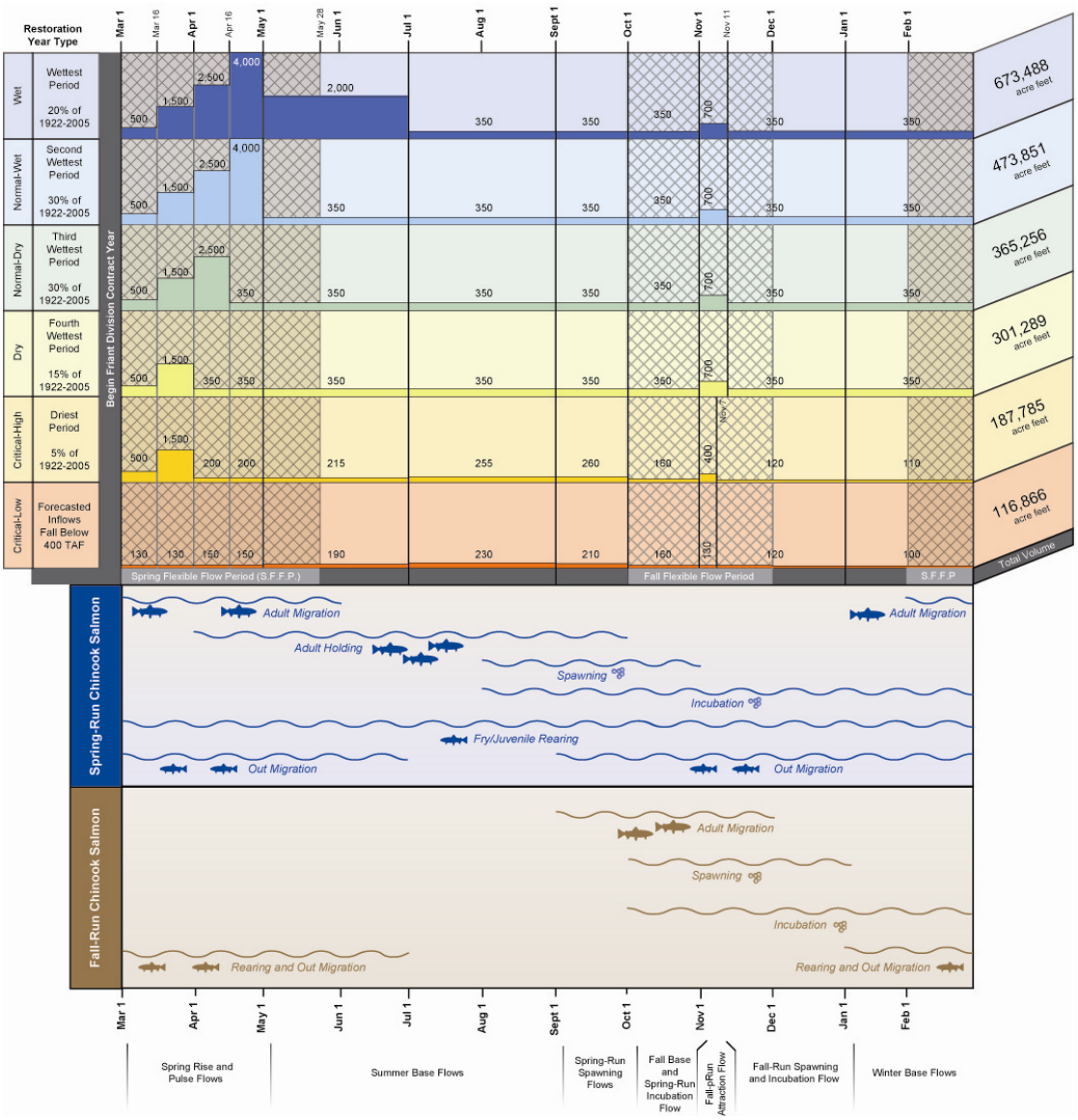
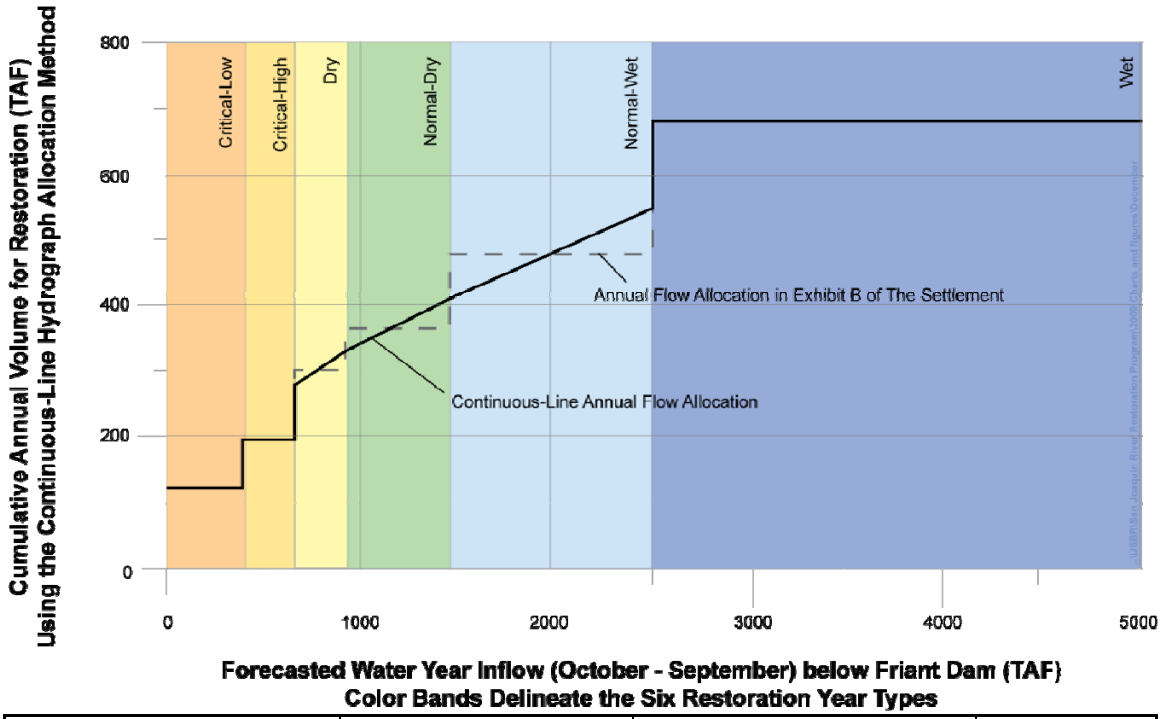


Figure 2.
Restoration Flow Schedules Specified in Exhibit B of Settlement



Forecasted Water Year Inflow (October – September) Below Friant Dam (TAF)	Annual Flow Allocation in Exhibit B of Settlement[1] (TAF)	Continuous-Line Annual Flow Allocation (TAF)	Restoration Year Type
Less than 400	116.7	116.9	Critical-Low
Greater than 400 to 670	187.5	187.8	Critical-High
Greater than 670 to 930	300.8	272.3 to 330.3	Dry
Greater than 930 to 1,450	364.6	Greater than 330.3 to 400.3	Normal-Dry
Greater than 1,450 to 2,500	473.0	Greater than 400.3 to 574.4	Normal-Wet
Greater than 2,500	672.3	673.5	Wet

Note:
[1] Friant Dam releases include deliveries to riparian water right holders in Reach 1 under "holding contracts," and releases for the Restoration Goal.

Key:
TAF = thousand acre-feet

Figure 3.
Continuous Annual Restoration Flow Allocation

Table 2.
Schedule for Release of Interim and Restoration Flows

Year(s)	Days	Release Flows
2009	October 1 through November 20	Of a timing and magnitude, as defined in the appropriate year type release schedule specified in Exhibit B of the Settlement, and without exceeding then-existing channel capacities[1]
2010	February 1 through December 1	Of a timing and magnitude, as defined in the appropriate year type release schedule specified in Exhibit B of the Settlement, and without exceeding then-existing channel capacities[1]
2011 – 2012	February 1 through May 1	Of a timing and magnitude, as defined in the appropriate year type release schedule specified in Exhibit B of the Settlement, and without exceeding then-existing channel capacities
	May 1 through December 1	To wet the channel down to the Chowchilla Bypass Bifurcation Structure to collect information regarding seepage losses[2]
2012 – 2014	January 1 through December 31	Of a timing and magnitude, as defined in the appropriate year type release schedule specified in Exhibit B of the Settlement, and without exceeding then-existing channel capacities or interfering with any remaining in-channel construction activities; continues until modifications identified in Paragraph 11(a) of the Settlement are completed and full Restoration Flows begin
2014 and later	January 1 through December 31	Of a timing and magnitude, as defined in the appropriate year type release schedule specified in Exhibit B of the Settlement, and without exceeding then-existing channel capacities or interfering with any remaining in-channel construction activities

Notes:
[1] Interim Flows during Water Year 2010 (October 1, 2009, through September 30, 2010) are described in the *Water Year 2010 Interim Flows Project Environmental Assessment/Initial Study* released by Reclamation and the California Department of Water Resources (DWR) in September 2009. Interim Flows during Water Year 2011 (October 1, 2010, through September 30, 2011) are described in the *Water Year 2011 Interim Flows Project Supplemental Environmental Assessment* released by Reclamation in September 2010.
[2] This period is intended to correspond to construction activities in Paragraph 11(a). Actual time period of these releases would be coincident with these activities.

Paragraph 15 of the Settlement describes an interim research program that includes the release of Interim Flows beginning in October 2009 and continuing until full Restoration Flows begin (anticipated January 1, 2014), as constrained by then-existing channel capacities). The RA, in consultation with the Technical Advisory Committee, the Secretary of the Interior (Secretary), and other appropriate Federal, State, and local agencies, will develop and recommend to the Secretary implementation of a program of Interim Flows. The Interim Flows are intended to allow collection of relevant data concerning flows, temperatures, fish needs, seepage losses, and water recirculation, recapture, and reuse. The Interim Flows include flow releases identified in Exhibit B of the Settlement for the appropriate water year type, including the flexible flow provisions of Exhibit B, to the extent that such releases would not impede or delay completion of actions specified in Paragraph 11(a) of the Settlement, or exceed downstream channel capacities.

The Settlement states that the "Secretary shall commence the Restoration Flows at the earliest possible date…provided, however, that the full Restoration Flows shall commence on a date certain no later than January 1, 2014. If, for any reason, full Restoration Flows are not released in any year beginning January 1, 2014, the Secretary, in consultation with the RA, shall release as

much of the Restoration Flows as possible in light of then-existing channel capacity and without delaying completion of the Phase 1 improvements." Paragraph 13(c) of the Settlement identifies procedures to address unexpected seepage losses, including acquiring water or options on water from willing sellers to be utilized for additional releases from Friant Dam.

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 (as subsequently described for common Restoration actions). Several Federal and State actions, including channel capacity modifications, are necessary before full Restoration Flows are released. The release of full Restoration Flows is subject to the provisions for flexible flow periods, buffer flows, and purchased water, as well as the provisions described above for Interim Flows. The release and conveyance of full Restoration Flows is defined for the purposes of this project description 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:

- **Friant Dam** – At or immediately below Friant Dam; designated as "Friant Release" in Exhibit B of the Settlement
- **Head of Reach 2A** – At Gravelly Ford; designated as "Reach 2" in Exhibit B of the Settlement
- **Head of Reach 2B** – Immediately below the Chowchilla Bypass Bifurcation Structure; designated as "Reach 3" in Exhibit B of the Settlement
- **Head of Reach 4A** – Downstream from Sack Dam; designated as "Reach 4" in Exhibit B of the Settlement
- **Head of Reach 4B** – Designated as "Reach 5" in Exhibit B of the Settlement
- **Confluence of Merced River** – Designated as "Confluence" in Exhibit B of the Settlement

Flow targets vary by Restoration Year Type, and range from zero cubic feet per second (cfs; in Reaches 3, 4A, and 4B in Critical-Low years) to 4,055 cfs (at the confluence of the Merced River in Wet and Normal-Wet years). In some years, the flow targets could be met partially or entirely by flood control releases or by local runoff or return flows.

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 flow schedule. In addition, the Settlement includes provisions for the release of pulse flows in Normal-Wet and Wet Years to perform several geomorphic functions such as flushing spawning gravels, unless the Secretary, in consultation with the RA, determines that such flows are not needed. Flushing flows would be accomplished with a quantity of water based on an average flow of 4,000 cfs from April 16 to 30, and include a peak release as close to

8,000 cfs as possible for several hours, within the constraints of channel capacity. The Settlement also includes 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.

Reclamation and the San Joaquin River Exchange Contractors have entered into a Second Amended Contract for Exchange of Waters (Contract Ilr-1144) (San Joaquin River Exchange Contract), dated February 14, 1968. Under the terms and conditions of that contract, Reclamation is obligated to deliver water from the Delta-Mendota Canal (DMC) or other sources to the San Joaquin River Exchange Contractors. 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 deliveries to the San Joaquin River Exchange Contractors via the San Joaquin River, these water deliveries would have a higher priority for channel capacity over Interim or Restoration flows. Therefore, Interim and Restoration flows would be reduced, as necessary, to provide channel capacity for water delivery to the San Joaquin River Exchange Contractors via the San Joaquin River. However, it is important to note that under Article 3(n) of the Friant Division long-term water service contracts and the recently executed Friant Division repayment contracts, "The United States agrees that it will not deliver to the Exchange Contractors thereunder waters of the San Joaquin River unless and until required by the terms of said contract, and the United States further agrees that it will not voluntarily and knowingly determine itself unable to deliver to the Exchange Contractors entitled thereto from water that is available or that may become available to it from the Sacramento River and its tributaries or the Sacramento-San Joaquin Delta those quantities required to satisfy the obligations of the United States under said Exchange Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights (Contract I1r-1145, dated July 27, 1939)."

Minimize Increases in Flood Risk in the Restoration Area due to the Release of Interim and Restoration Flows. Throughout Settlement implementation, the maximum downstream extent and rate of Interim and Restoration flows to be released would be maintained at or below then-existing channel capacities. As channel or structure modifications are completed with additional environmental compliance, maximum Interim Flow releases would be correspondingly increased in accordance with then-existing channel capacities and with the release schedule. Consistent with the Act, Interim and Restoration flows would be reduced, as needed, to address material seepage impacts, as identified through the monitoring program (see Appendix D of the Draft PEIS/R, "Physical Monitoring and Management Plan"). If release of water from Friant Dam is required for flood control purposes, concurrent Interim and Restoration flows would be reduced by an amount equivalent to the required flood control release. If flood control releases from Friant exceed the concurrent scheduled Interim and Restoration flows, no additional releases above those required for flood control would be made for SJRRP purposes.

Then-existing channel capacities within the Restoration Area correspond to flows that would not significantly increase flood risk from Interim and Restoration flows in the Restoration Area. The

action to release Interim and Restoration flows includes measures that would achieve the following objectives: (1) commit Reclamation to implementing actions that would meet performance standards that minimize increases in flood risk as a result of Interim or Restoration flows, (2) limit the release and conveyance of Interim and Restoration flows to those flows that would remain in-channel until adequate data are available to apply the performance standards and until the performance standards are satisfied, and (3) enable the Settlement to be implemented in coordination with other ongoing and future actions outside of the Settlement that could address channel capacity issues identified in the Settlement or through the SJRRP or other programs. Implementation of measures that achieve these objectives would allow for the safe release and conveyance of Interim and Restoration flows throughout the duration of Settlement implementation. Reclamation would implement the following three integrated measures that collectively minimize increases in flood risk as a result of Interim or Restoration flows during Settlement implementation:

- **Establish a Channel Capacity Advisory Group and Determine and Update Estimates of Then-Existing Channel Capacities as Needed –** The establishment and administration of a Channel Capacity Advisory Group to provide independent review of estimated then-existing channel capacities, monitoring results, and management actions to address vegetation and sediment transport within the system as identified by Reclamation.

- **Maintain Interim and Restoration Flows at or Below Estimates of Then-Existing Channel Capacities –** The process for limiting Interim and Restoration flows to reduce the risk of levee failure due to underseepage, through-seepage, and associated levee stability issues to less-than-significant levels.

- **Closely Monitor Erosion and Perform Maintenance and/or Reduce Interim and Restoration Flows as Necessary to Avoid Erosion-Related Impacts –** The commitment by Reclamation to implement erosion monitoring and management, including monitoring potential erosion sites, reducing Interim and Restoration flows as necessary, and reporting ongoing results of monitoring and management actions to the Channel Capacity Advisory Group.

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 USACE levee criteria shown in Table 3. 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. The underseepage Factor of Safety is defined as a ratio of the critical hydraulic gradient to the actual exit gradient of seepage on the. 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).

Table 3.
Minimum Factors of Safety - Levee Slope Stability

Type of Slope	Applicable Stability Conditions and Required Factors of Safety			
	End-of-Construction	Long-Term (Steady Seepage)	Rapid Drawdown[a]	Earthquake[b]
New Levees	1.3	1.4	1.0 to 1.2	(see below)
Existing Levees	--	1.4[c]	1.0 to 1.2	(see below)
Other Embankments and Dikes[d]	1.3[e,f]	1.4[c,f]	1.0 to 1.2[f]	(see below)

Source: U.S. Army Corps of Engineers. 2000. Design and Construction of Levees Engineering and Design Manual. Manual No. 1110-2-1913. April. Table 6-1b, page 6-5.

Notes:

[a] Sudden drawdown analyses. F. S. = 1.0 applies to pool levels prior to drawdown for conditions where these water levels are unlikely to persist for long periods preceding drawdown. F. S. = 1.2 applies to pool level, likely to persist for long periods prior to drawdown.

[b] See ER 1110-2-1806 for guidance. An EM for seismic stability analysis is under preparation.

[c] For existing slopes where either sliding or large deformation have occurred previously and back analyses have been performed to establish design shear strengths lower factors of safety may be used. In such cases probabilistic analyses may be useful in supporting the use of lower factors of safety for design.

[d] Includes slopes which are part of cofferdams, retention dikes, stockpiles, navigation channels, breakwater, river banks, and excavation slopes.

[e] Temporary excavated slopes are sometimes designed for only short-term stability with the knowledge that long-term stability is not adequate. In such cases higher factors of safety may be required for end-of-construction to ensure stability during the time the excavation is to remain open. Special care is required in design of temporary slopes, which do not have adequate stability for the long-term (steady seepage) condition.

[f] Lower factors of safety may be appropriate when the consequences of failure in terms of safety, environmental damage and economic losses are small.

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 not met and would trigger immediate reductions in Interim and Restoration flows at the site. Such observations would supersede channel capacity estimates, and Interim and Restoration flows would be reduced in areas where these conditions occur. Potential immediate responses to reduce, redirect, or redivert Interim or Restoration flows to reduce flow in downstream reaches is described in the Physical Monitoring and Management Plan discussion below. 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.

Detailed discussion of these three measures to reduce flood risk from the release and conveyance of Interim and Restoration flows is presented below.

Establish a Channel Capacity Advisory Group, and Determine and Update Estimates of Channel Capacities as Needed. In coordination with California Department of Water Resources (DWR) and prior to releasing Interim Flows in Water Year 2013, Reclamation would establish a Channel Capacity Advisory Group to provide independent review of then-existing channel capacities estimated by Reclamation in accordance with standard USACE levee performance criteria. The Channel Capacity Advisory Group provide timely independent review of data, analytical methodology, and results used to estimate then-existing channel capacities. The Channel Capacity Advisory Group would be comprised of the following:

- One member from the U.S. Bureau of Reclamation
- One member from the California Department of Water Resources
- One member from the U.S. Army Corps of Engineers
- One member from the Lower San Joaquin Levee District
- One member from the Central Valley Flood Protection Board

Reclamation would prepare a report annually or whenever Reclamation contemplates increasing the upper limit of releases for Interim or Restoration flows, which would include data and methods used to develop estimates of then-existing channel capacities. A draft report would be provided to the Channel Capacity Advisory Group for its review and comment for a period of 60 days. In the event that comments or recommendations are received from the Advisory Group within 60 days, Reclamation would be required to consider and respond to such comments and prepare a final report for distribution to the Channel Capacity Advisory Group within 60 days of the close of the draft report review period. Reclamation would not increase Interim or Restoration flows above the previously determined then-existing channel capacities until 10 days after the final report is prepared and distributed to the Channel Capacity Advisory Group. The first draft report shall be completed within 1 year of signing the PEIS/R Record of Decision. Draft reports would include the data, methods, and estimated channel capacities; flow limits and any maintenance activities; and monitoring efforts and management actions as described in this project description. Draft and final reports would be made available to the public concurrent with their distribution to the Channel Capacity Advisory Group.

Reclamation would convene the Channel Capacity Advisory Group as required until 2030, but may stop earlier, provided that then-existing channel capacities are determined to equal or exceed the maximum proposed Restoration Flows throughout the Restoration Area. If after 2030 then-existing channel capacities decrease such that full Restoration Flows cannot be conveyed, the Channel Capacity Advisory Group would be reconvened and function as described above until such time that the then-existing channel capacities are determined to equal or exceed the full Restoration Flows.

Maintain Interim and Restoration Flows at or Below Estimated Then-Existing Channel Capacities. Until sufficient data are available to determine the Factor of Safety, Reclamation would limit initial Interim and Restoration flow releases to those flows that 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 Flows to those flows that 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.

In coordination with DWR, Reclamation would apply standard USACE levee performance criteria for levees under a steady state of saturation and consider past performance and hydrologic and hydraulic modeling to determine and update estimates of channel capacities. The resulting estimated channel capacities would be used to establish limits for Interim and Restoration flows throughout the Restoration Area. Reclamation would be required to provide this estimate to the Channel Capacity Advisory Group for review, as previously described.

In the event that insufficient information is available to develop an estimate of channel capacities that maintain minimum Factors of Safety for levees under saturated conditions by Water Year 2013, Reclamation would limit initial Interim and Restoration flows to those flows which would remain in-channel, as determined by DWR using one-dimensional HEC-RAS hydraulic modeling and described in Appendix I of the Draft PEIS/R. In-channel flows would have less-than-significant effects on flood risk as explained in the PEIS/R impact assessment of in-channel flows.

Factors of Safety 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 (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).

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 of the Draft

PEIS/R, "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.

Closely Monitor Erosion and Perform Maintenance and/or Reduce Interim or Restoration Flows as Necessary to Avoid Erosion-Related Impacts. As part of the draft reports prepared by Reclamation and submitted to the Channel Capacity Advisory Group (as described previously), Reclamation would describe the monitoring and management actions taken within the Restoration Area over the prior year and the monitoring and management actions planned for the following year. The draft reports would identify those monitoring and management actions that are a result of implementing the Settlement and those that are a result of regular operations and maintenance and capital improvements to flood control facilities of the Lower San Joaquin River Flood Control Project. The draft reports would be submitted to the Channel Capacity Advisory Group for review as previously described.

Reclamation would implement the flood-related monitoring and management actions included in the project description and in the draft reports to the Channel Capacity Advisory Group, and would work with the appropriate agency(ies) to implement these actions to meet the performance standards as previously described. As previously described, systematic levee condition monitoring would be implemented as described in more detail in Appendix D of the Draft PEIS/R, "Physical Monitoring and Management Plan," and could lead to the immediate reduction of Interim or Restoration flows in areas where these conditions occur.

Erosion monitoring would be conducted by Reclamation using several standard methodologies and protocols commonly employed by DWR, reclamation districts, and/or USACE to monitor levee erosion. Aerial photography and/or ground surveys would be compared to identify changes in bank line over time, indicating potential erosion. True color aerial photographs would be inspected and compared to previous aerial photographs to identify areas of sediment mobilization, bar formation, and bank erosion. After these areas have been initially identified using aerial photography, they would be visited and inspected. If inspections indicate that erosion-related impacts exist or are imminent, management actions would be taken to address the issue.

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 surveys would assess the condition of potential erosion sites, and could include a variety of techniques such as aerial photography and topographic surveys. Previous information documents the existing sediment and geomorphology conditions within the Restoration Area. Existing information developed by Reclamation includes preliminary analyses conducted to identify locations susceptible to potential erosion through comparison of present-day channel positions (2004) and historical channel positions (1937, 1938). Reclamation identified areas that may be susceptible to future erosion using the following criteria:

- Areas of channel change between 1937 and 2004 or between 1938 and 2004 where the channel has shown lateral erosion along an outer bend or where it has the potential to reoccupy an old channel position and laterally erode banks along an outer bend, and that also have low topography (for instance, several outer bends in Reach 1A are located adjacent to high bluffs, which would be considered an area of slower erosion and are thus not identified).

- Meander necks where channel sinuosity is high and could create a cutoff.

- Areas along outer bends where excavated gravel pits are located close to the active channel, regardless of whether any historical channel change has occurred.

- Areas along outer bends that are located adjacent to developed areas (such as at Firebaugh).

- Areas with the potential for future erosion identified through this process and prioritized for monitoring based on potential impacts to infrastructure. The highest priorities were those with residential developments, buildings, and bridges. Other high-priority areas included those containing levees, irrigation canals, and roads with an apparent high potential to experience some lateral migration or bank erosion.

Sediment mobilization monitoring during these surveys would focus on specific potential erosion sites identified through this process, and would evaluate current and potential future erosion at these sites. Channel bed deposition would be evaluated as necessary by analyzing changes identified in topographic survey data and LIDAR surveys.

The Lower San Joaquin Levee District (LSJLD) and the Central Valley Flood Protection Board (CVFPB) currently have responsibility for implementing routine operations and maintenance or capital improvements to the Lower San Joaquin River Flood Control Project. Changes to the Lower San Joaquin River Flood Control Project would require USACE approval.

Erosion management actions identified through monitoring as described above may fall under the routine maintenance of the Lower San Joaquin River Flood Control Project currently performed by LSJLD. If increased maintenance activities and costs are required as a result of implementing the Settlement, including additional erosion management actions identified through the monitoring activities described in this section, Reclamation would conduct or enter into an agreement with others to conduct such additional maintenance activities. Currently, Reclamation is working with LSJLD to develop and implement an agreement to provide financial assistance for additional costs incurred by LSJLD. The financial assistance agreement is intended to assist LSJLD in adapting to changes in operations and maintenance activities, as needed to maintain the existing level of flood management under release of Interim and Restoration flows.

Reoperate Downstream Flow Control Structures. In addition to management of Interim and Restoration flows at Friant Dam, Alternative C1 includes modifications to the 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-related activities to modify the channels, to address the following:

- **Reoperate Chowchilla Bypass Bifurcation Structure to convey Restoration Flows into Reach 2B –** Currently, the structure is operated as part of the flood management system to direct flood flows and irrigation deliveries based on several factors, including flows in Reach 2A, the capacity of Reach 2B, flows from the Kings River system via Fresno Slough, and water demands in the Mendota Pool. Modifications to the operating criteria would incorporate the routing of Interim and Restoration flows during nonflood operations to meet flow targets in Reach 2B. If flood releases are made from Friant Dam in excess of the Interim or Restoration flows called for, Interim and Restoration flows would not be released and standard operation of the flood management system would apply. Interim and Restoration flows would have a lower priority for downstream channel capacity than flood flows or irrigation deliveries to the San Joaquin River Exchange Contractors.

- **Reoperate San Joaquin River Headgate Structure to convey Restoration Flows into Reach 4B1 –** The current conveyance capacity of Reach 4B1 is unknown and could be as low as zero in some locations. Currently, the San Joaquin River Headgate Structure, part of the flood management system, is maintained in a closed position whereby all flows in the river are routed into the bypass system. The San Joaquin River Headgate Structure would be operated to release Interim and Restoration flows to Reach 4B1 after completion of modifications to provide for increased capacity in Reach 4B1, and modifications to the headgate structure are completed. These releases would be limited by then-existing channel capacity in Reach 4B1.

- **Reoperate the Eastside and Mariposa bypass bifurcation structures to convey Interim and Restoration flows into Reach 4B2 –** Modifications to the operating criteria for these structures, which are part of the flood management system, would include routing Interim and Restoration flows to the Eastside or Mariposa bypasses. Interim and Restoration flows would have a lower priority for downstream channel capacity than flood flows.

- **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 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.

Establish Recovered Water Account and Program. The release of Interim and Restoration flows would reduce annual water deliveries to Friant Division long-term contractors. Consistent with Paragraph 16(b) of the Settlement, Reclamation would identify delivery reductions to Friant Division long-term contractors associated with the release of Interim and Restoration flows, as part of the RWA stipulated for implementation under Paragraph 16(b). Paragraph 16(b) also provides for the delivery of water during wet hydrologic conditions to Friant Division long-term contractors at a cost of $10 per acre-foot. Implementing Paragraph 16(b) actions could affect the amount of water that is released to the San Joaquin River in excess of Restoration Flow requirements during wet periods. The diversion of water from Friant Dam pursuant to Paragraph 16(b) would be based on the following conditions:

- Water at Friant Dam would be eligible for delivery to Friant Division long-term contractors, pursuant to Paragraph 16(b), in wet hydrologic conditions when water is not needed for Interim and Restoration flows.

- Paragraph 16(b) water would be conveyed through the Friant-Kern and Madera canals only when capacity is available, without impacting requirements to meet existing contract deliveries to Friant Division long-term contractors.

- Potential future demand for Paragraph 16(b) water in all action alternatives is based in part on the implementation of actions by Friant Division long-term contractors or other water users to increase surface water conveyance or groundwater recharge capacity.

It is anticipated that Friant Division long-term contractors would be able to accept delivery of some Paragraph 16(b) water using existing water conveyance and storage facilities. Because Paragraph 16(b) water would likely be available predominantly during periods when irrigation demand is limited, it is expected that Friant Division and non-Friant Division water users could develop additional local conveyance and storage capacity to increase their ability to receive Paragraph 16(b) water supplies. The program alternatives are evaluated in consideration of the range of potential changes in water diversions that could result from implementing water facility improvements in the Friant Division to increase delivery capability. Facility improvements to increase delivery capability would require separate environmental compliance documentation, and are not included as actions under the program alternatives. Pursuant to Part III of the Omnibus Public Land Management Act of 2009 (Public Law 111-11), the Secretary is developing proposed guidelines for projects designed to reduce, avoid, or offset the quantity of expected water supply impacts to Friant Division long-term contractors caused by Interim and Restoration flows. This process is occurring parallel to and separate from development of the PEIS/R and this ROD.

Reclamation is currently working with the Friant Division long-term contractors and appropriate agencies to develop procedures for identifying delivery reductions to Friant Division long-term

contractors associated with the release of Interim and Restoration flows as part of the RWA stipulated for implementation under Paragraph 16(b).

Recapture Interim and Restoration Flows

Project-level water recapture actions in Alternative C1 include recapturing Interim and Restoration flows using existing facilities in the Restoration Area and in the Delta. Recaptured water available for transfer to Friant Division long-term contractors would range from zero to 556 TAF, as shown in Table 1. Reclamation would identify actual delivery reductions to Friant Division long-term contractors associated with the release of Interim and Restoration flows.

Recapture in the Restoration Area. Alternative C1 includes potential recapture of up to the total quantity of Interim and Restoration flows (556 TAF, as shown in Table 1) within the Restoration Area using existing facilities. As previously described, the Settlement includes flow targets in six locations to determine achievement of the Restoration Goal. Paragraph 16(a)(1) of the Settlement provides that recapture and recirculation of Interim and Restoration Flows "shall have no adverse impact on the Restoration Goal, downstream water quality or fisheries." 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, or to avoid potential material adverse impacts from groundwater seepage (as described in Appendix D of the Draft PEIS/R, "Physical Monitoring and Management Plan") or for other emergency actions to avoid immediate adverse impacts. Interim and Restoration flows would be recaptured consistent with Federal, State, and local laws, and future agreements with downstream agencies, entities, and landowners. Potential locations within the Restoration Area for 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 potential to recirculate Interim and Restoration flows to the Friant Division would be used for recapture locations.

No change in operational requirements would be required to recapture Interim and Restoration flows in the Restoration Area or in the Delta under the regulatory compliance standards in place at the time water is recaptured. Any increase in Restoration Area or Delta exports directly resulting from the Interim or Restoration flows would be available for recirculation to the Friant Division; however, recirculation of recaptured water to the Friant Division could require subsequent exchange agreements between Reclamation, DWR, Friant Division long-term contractors, and other south-of-Delta CVP/SWP contractors who are not parties to the Settlement. As previously described, recirculation would be subject to available capacity and existing operational constraints within CVP/SWP storage and conveyance facilities.

Locations available for recapture of Interim and Restoration flows within the Restoration Area include the following:

- **Recapture at Mendota Pool** – Interim and Restoration flows could be diverted from the Mendota Pool to the extent that these flows would meet demands, replacing CVP water supplies that would otherwise be delivered via the DMC. The DMC carries water from the Delta to the Mendota Pool, where the water is diverted through several existing pumps and canals with a combined capacity that exceeds upstream channel capacity.

Interim and Restoration flows diverted by CVP contractors at the Mendota Pool would be in lieu of supplies typically delivered via the DMC. Therefore, CVP water supplies that would have been delivered via the DMC would be made available for delivery to the Friant Division, subject to existing contractual obligations and existing and any future agreements. In such cases, Delta exports would not change compared to the No-Action Alternative. Exported water, up to the amount diverted at the Mendota Pool, would be available for recirculation to the Friant Division using existing south-of-Delta facilities, including the C.W. "Bill" Jones Pumping Plant (Jones Pumping Plant) and Harvey O. Banks Pumping Plant (Banks Pumping Plant), California Aqueduct, DMC, San Luis Reservoir and related pumping facilities, and other facilities operated by CVP/SWP contractors, as shown on Figure 4.

- **Recapture at wildlife refuge** – If considerations in Reach 5 or in downstream reaches (such as channel capacity or potential take of listed species that could not be avoided) require that less (or no) flow enters those reaches, Interim and Restoration flows could be diverted to the Lone Tree Unit in the 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.

Recapture in Delta. Interim and Restoration flows reaching the Delta would be recaptured at existing facilities within the Delta consistent with applicable laws, regulations, biological opinions (BOs), and court orders in place at the time the water is recaptured. Alternative C1 includes recapture of Interim and Restoration flows in the Delta at the Jones and Banks pumping plants (Figure 1), operated consistent with applicable laws, regulations, BOs, and court orders in place at the time the water is recaptured.

Key: P.P. = Pumping Plant

Figure 4.
Major Facilities That May Be Used in Recapture and Recirculation of Interim and Restoration Flows

1.2 Program-Level Actions

Alternative C1 includes recirculating recaptured Interim and Restoration flows and common Restoration actions. The Physical Monitoring and Management Plan (Appendix D of the Draft PEIS/R) and the Conservation Strategy (Table 4 below), which include both project- and program-level actions, are described in a separate subsection.

Program level described in more detail below are as follows:

- **Recirculate recaptured Interim and Restoration flows** – Alternative C1 includes recirculating up to the full amount of recaptured Interim and Restoration flows to the Friant Division to minimize water supply impacts to Friant Division long-term contractors caused by Interim and Restoration flows.

- **Additional Water Management Actions on San Joaquin River –** Alternative C1 includes recapturing Interim and Restoration flows from the San Joaquin River below the Merced River confluence at existing pumping facilities owned and operated by CVP contractors and potential in-district modifications to existing off-river facilities to facilitate routing or storage of water, such as expanding existing canals or constructing lift stations on existing canals.

- **Common Restoration actions –** Alternative C1 includes Common Restoration actions, potential physical actions to achieve the Restoration Goal that are common to all action alternatives, and which would be implemented within the Restoration Area, as shown in Figure 5. These include actions to modify Reach 4B1 to convey at least 475 cfs of Interim and Restoration flows.

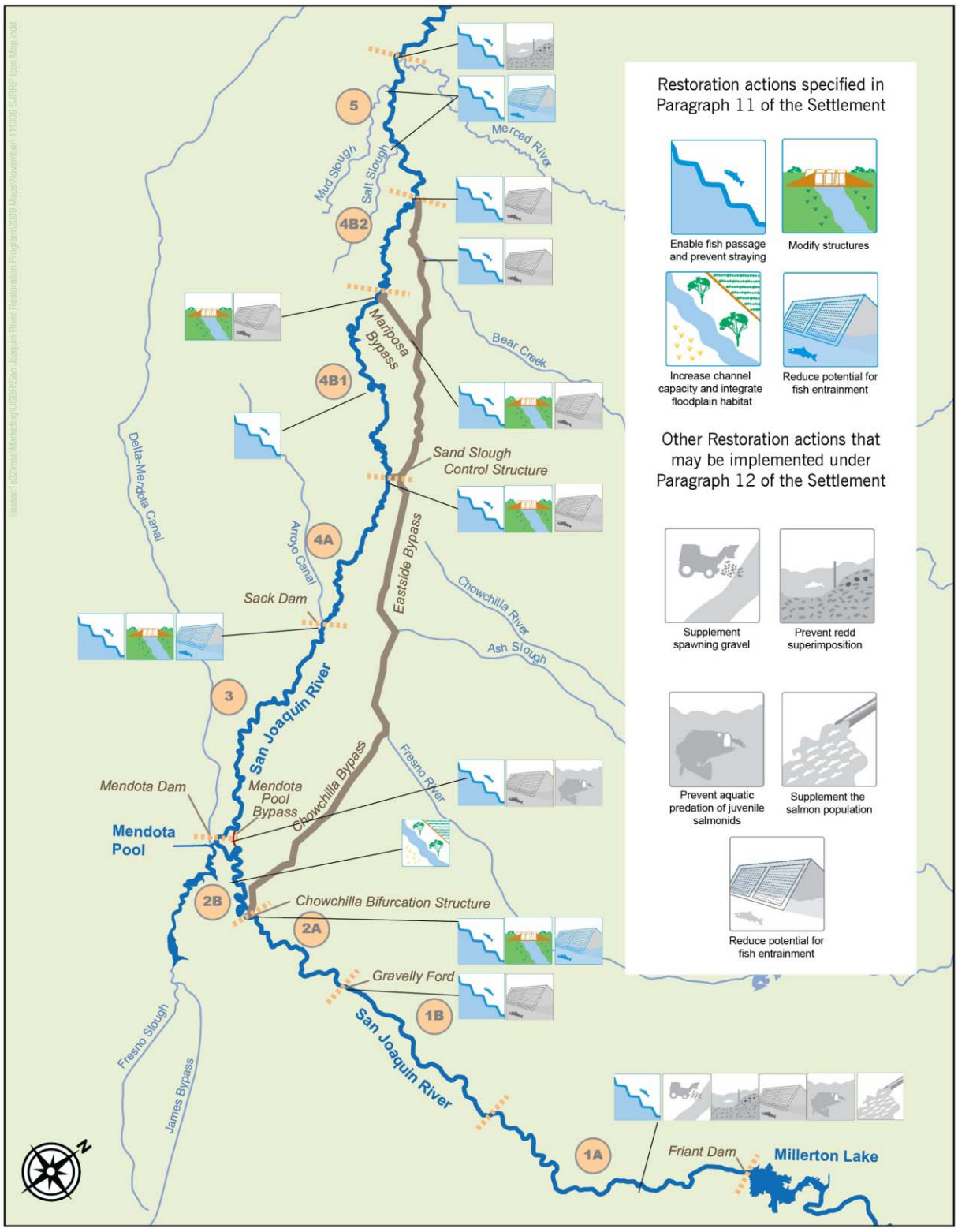


Figure 5.
Location of Common Restoration Actions Included in Alternative C1

Recirculate Recaptured Interim and Restoration Flows

Paragraph 16(a) of the Settlement stipulates that the Secretary, in consultation with the Settling Parties, is to develop and implement "…a plan for recirculation, recapture, reuse, exchange, or transfer of the Interim and Restoration flows for the purpose of reducing or avoiding impacts to water deliveries to all of the Friant Division long-term contractors caused by the Interim Flows and Restoration Flows," provided "…that any recirculation, recapture, reuse, exchange or transfer of the Interim and Restoration flows shall have no adverse impact on the Restoration Goal, downstream water quality or fisheries." The quantity of water available for recirculation to the Friant Division long-term contractors would be up to the amount of water recaptured at existing facilities or new or modified facilities. Water recaptured and recirculated to the Friant Division in this manner could require exchange agreements between Reclamation, DWR, Friant Division long-term contractors, and other south-of-Delta CVP/SWP contractors. The details of the plan for recirculation would be determined through future negotiations between affected parties. Alternative C1 does not include 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.

Recirculation would be subject to available capacity within CVP/SWP storage and conveyance facilities. Available capacity is capacity that is left after satisfying all statutory and contractual obligations to existing water service or supply contracts, exchange contracts, settlement contracts, transfers, or other agreements involving or intended to benefit CVP/SWP contractors served water through CVP/SWP facilities. No additional agreements would be required to recapture Interim and Restoration flows in the Restoration Area. However, recirculation of recaptured water to the Friant Division could require mutual agreements between Reclamation, DWR, Friant Division long-term contractors, and other south-of-Delta CVP/SWP contractors. Reclamation would develop these agreements in close coordination with Friant Division long-term contractors. Any mutual agreements negotiated to facilitate delivery of water to Friant Division contractors using CVP/SWP facilities would be negotiated so as not to impact CVP/SWP deliveries or operation of the CVP/SWP; such agreements may require additional environmental documentation. In addition, Paragraph 13(i) of the Settlement provides guidance on how to manage any unreleased Restoration Flows starting in 2014, including but not limited options to enter into mutually acceptable agreements with Friant Division long-term contractors or third parties, "…to (A) bank, store, or exchange such water for future use to supplement future Restoration Flows, or (B) transfer or sell such water and deposit the proceeds of such transfer or sale into the Restoration Fund created by this Settlement." Paragraph 13(i) also specifies the release of water from Friant Dam during times of the year other than those specified in the applicable hydrograph. Any mutual agreements negotiated to facilitate the actions under Paragraph 13(i) would be negotiated so as not to increase water supply reductions to Friant Division long-term contractors beyond what would have been caused by releases in accordance with the hydrograph releases in Exhibit B of the Settlement. Such agreements may require additional environmental documentation.

Additional Water Management Actions on San Joaquin River

Program-level actions identified in Alternative C1 include recapturing Interim and Restoration flows from the San Joaquin River below the Merced River confluence at existing pumping facilities owned and operated by CVP contractors who possess San Joaquin River water rights,

as illustrated in Figure 1. These actions could include potential in-district modifications to existing off-river facilities to facilitate routing or storage of water, such as expanding existing canals or constructing lift stations on existing canals. In addition to water exchanges with existing water right holders along the San Joaquin River, Alternative C1 also includes constructing new infrastructure to increase pumping capacity along the San Joaquin River below the Merced River confluence for the direct recapture of Interim and Restoration flows, and infrastructure to convey recaptured flows to the DMC or California Aqueduct. Construction of new pumping capacity would include a new pumping plant on the San Joaquin River or enlarging the pumping capacity of an existing facility on the San Joaquin River. Before completion of new pumping capacity on the river, recapture would occur in the Delta and/or at existing facilities along the river.

These actions are analyzed at a program level in the Draft PEIS/R. Recaptured Interim and Restoration flows from the San Joaquin River would be exchanged for CVP Delta water supplies scheduled for delivery to these CVP contractors. Implementing recapture at existing facilities on the San Joaquin River would require agreements with San Joaquin River water right holders to allow pumping of Interim and Restoration flows in exchange for delivery of CVP water from the Delta. Recapture of Interim or Restoration flows at 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 extent they are available, CVP storage and conveyance facilities would be used to convey the exchanged water to the Friant Division.

The new pumping infrastructure could have a capacity of up to 1,000 cfs, and would be located on the San Joaquin River downstream from the Merced River confluence and upstream from Vernalis. This river reach includes a range of anticipated flows and water quality conditions that would affect design and operation of the facility; therefore, the location and capacity of the pumping infrastructure would be determined as part of a subsequent site-specific study. New pumping infrastructure would also include 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 extent they are available, existing south-of-Delta CVP and SWP storage and conveyance facilities would be used to recirculate recaptured water to the Friant Division.

Water supply recaptured through exchange with San Joaquin River water right holders or new pumping capacity along the San Joaquin River would be available to Friant Division long-term contractors would range from zero to the total amount of recaptured Interim and Restoration flows. Recapture would be limited by conveyance capacity and conditions identified by exchanging entities, such as water quality requirements for land application or other potential concerns.

Implementing Alternative C1 would require exchange and/or conveyance agreements between Reclamation and CVP water users who possess water rights on the San Joaquin River. This alternative also would require exchange and/or conveyance agreements for recirculating recaptured Interim and Restoration flows at Delta export pumping facilities.

The availability of water would be limited to direct recapture of Interim and Restoration flows in the San Joaquin River and in the Delta. Recaptured water available to Friant Division long-term contractors would range from zero to the total amount of recaptured Interim and Restoration flows, and would be limited by conveyance capacity and water quality requirements for introducing recaptured water to the DMC and California Aqueduct. The conveyance of water would be limited by physical pumping plant capacity, permit limitations for pumping from the San Joaquin River, and available conveyance capacity in the DMC and the California Aqueduct. New water right permits, or modifications to existing permits, would be needed to redivert water from the San Joaquin River at new pumping infrastructure.

Common Restoration Actions

Common Restoration actions include actions stipulated in Paragraphs 11 and 14 of the Settlement, as well as additional structural or channel improvements that may further enhance the success of achieving the Restoration Goal under Paragraph 12 of the Settlement.

- **Paragraph 11(a).** Common Restoration actions stipulated in Paragraph 11 of the Settlement include channel modifications to be completed in two phases. Phase 1 actions are the 10 actions stipulated in Paragraph 11(a) of the Settlement that are considered the highest priority channel improvements. Two potential actions require subsequent decisions to determine their necessity: (1) modifications to the San Joaquin River Headgate Structure at the head of Reach 4B1, and (2) modifications in the Eastside and Mariposa bypasses to provide fish passage under low flows. In the following sections, these 10 Phase 1 actions are grouped by common location and/or other linkages, and include the following:

  - **Paragraphs 11(a)(1) and 11(a)(2)** – Construct Mendota Pool Bypass and Modify Reach 2B to convey at least 4,500 cfs

  - **Paragraph 11(a)(3)** – Modify Reach 4B1 to convey at least 475 cfs

  - **Paragraph 11(a)(4)** – Modify San Joaquin River Headgate Structure to enable fish passage

  - **Paragraph 11(a)(5)** – Modify Sand Slough Control Structure to enable fish passage and flow routing

  - **Paragraphs 11(a)(6) and 11(a)(7)** – Screen Arroyo Canal and provide fish passage at Sack Dam

  - **Paragraphs 11(a)(8) and 11(a)(9)** – Modify Eastside and Mariposa bypasses to enable fish passage

  - **Paragraph 11(a)(10)** – Enable deployment of seasonal barriers at Mud and Salt sloughs

- **Paragraph 11(b).** The four Phase 2 actions stipulated in Paragraph 11(b) of the Settlement also are considered high priority channel improvements that may contribute to

achieving the Restoration Goal. Subsequent decisions would be required to determine whether the Phase 2 actions are necessary and, if so, to define the scope of the actions. Phase 2 actions not included in Alternative C1 involve modifications to enable routing of up to 4,500 cfs into and through Reach 4B1. The following Phase 2 actions included in Alternative C1 are described in the following sections:

  - **Paragraph 11(b)(2)** – Modify Chowchilla Bypass Bifurcation Structure

  - **Paragraph 11(b)(3)** – Fill or isolate gravel pits

- **Paragraph 14.** Paragraph 14 of the Settlement stipulates that spring-run and fall-run Chinook salmon be reintroduced to the San Joaquin River.

- **Paragraph 12.** Paragraph 12 states that additional structural or channel improvements that may further enhance the success of achieving the Restoration Goal may be recommended by the RA to the Secretary for implementation. Site-specific studies and subsequent implementation of future potential Restoration actions under Paragraph 12 of the Settlement would be based on information collected through monitoring, as identified in the Physical Monitoring and Management Plan (Appendix D of the Draft PEIS/R), during implementation of Settlement-stipulated actions. Potential Restoration actions pursuant to Paragraph 12 that could be identified by the RA at a future date range from no modifications to the level of implementation described below. Appendix E of the Draft PEIS/R, "Fisheries Management Plan," addresses specific actions, including those described below, and evaluates their merits (including uncertainty) in an action routing process. The following potential Paragraph 12 actions included in Alternative C1 are described in the following sections:

  - Enhance Spawning Gravel

  - Reduce Potential for Redd Superimposition and/or Hybridization

  - Supplement 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

All alternatives include the anticipated range of potential implementation for common actions under Paragraphs 11, 14, and 12 of the Settlement, as described below and shown in Figure 5. All common Restoration actions would require future, separate project-specific planning studies

and NEPA and/or CEQA documentation analyzing the effects of implementation. The details described below for these actions are based on initial engineering concepts and information from the Fisheries Management Plan (Appendix E of the Draft PEIS/R). These details are subject to change as additional project-specific information is developed.

Common Restoration actions include modifications to the channel and flow control structures, including levees and other portions of the Lower San Joaquin Flood Control Project. As part of any modifications that could affect operation of the Lower San Joaquin Flood Control Project, the lead agencies would conduct a study to determine needed conveyance modifications, including modifications to levees and other related hydraulic features, to maintain existing levels of flood protection. Channel and facility modifications would be designed to not adversely affect flood conveyance capacity or functionality of existing channels and facilities.

Construct Mendota Pool Bypass and Modify Reach 2B. Paragraph 11(a)(1) of the Settlement stipulates the creation of a bypass channel around the Mendota Pool to convey at least 4,500 cfs from Reach 2B downstream to Reach 3. Paragraph 11(a)(2) of the Settlement stipulates modifications in channel capacity, and incorporation of new floodplain habitat and related riparian habitat, to convey at least 4,500 cfs between the Chowchilla Bypass Bifurcation Structure and new Mendota Pool Bypass. Because the functions of these channels are related, they are described together in this section:

- **Construct Mendota Pool Bypass –** Constructing Mendota Pool Bypass includes building a bypass around the Mendota Pool to convey at least 4,500 cfs from Reach 2B to Reach 3 downstream from Mendota Dam. Riparian habitat in the Mendota Pool Bypass is expected to be similar to new floodplain habitat in Reach 2B. Constructing the Mendota Pool Bypass also includes constructing a bifurcation structure in Reach 2B to convey at least 4,500 cfs to the bypass. The bifurcation structure would include a fish screen or other positive fish barrier to direct fish into the bypass channel and minimize or avoid fish passage from Reach 2B to the Mendota Pool. Additionally, the Mendota Pool Bypass would include one or more grade control structures to control bedform and create stable and suitable habitat conditions for fish in the vicinity.

- **Modify Reach 2B to convey at least 4,500 cfs –** Modifying Reach 2B to convey at least 4,500 cfs includes expanding the capacity of the reach to convey at least 4,500 cfs, with integrated floodplain habitat. New levees would be constructed, potentially along either or both sides of Reach 2B, to create an average floodplain width of between 500 feet and 3,700 feet, an associated levee system width of between 700 feet and 3,900 feet, and levee heights of an average 4 feet to 5 feet, depending on the level of floodplain habitat modifications incorporated. Specific levee alignments and modifications would be determined through a separate, project-specific study that would consider a variety of factors, including, but not limited to, fisheries and other environmental requirements, flood risk reduction, land uses, subsurface conditions, topography, and the condition of existing levees. Because of uncertainty regarding the life history behavior of introduced salmon, modifications to Reach 2B may or may not emphasize floodplain habitat for rearing juvenile Chinook salmon, and any modifications would be determined from results of subsequent site-specific studies.

The San Mateo Road, which crosses the river in Reach 2B, may cause backwater effects and downstream scour, and may act as a barrier to upstream salmon migration during low flows. Subsequent, project-specific technical studies of this crossing would identify the type of modifications that would be necessary for flow and fish passage.

Depending on the final, constructed channel capacity of Reach 2B above the new Mendota Pool Bypass Bifurcation Structure, simultaneous release of 4,500 cfs Restoration Flows to the Mendota Pool Bypass and delivery of San Joaquin River flows to the Mendota Pool may not be possible. Similarly, because Reach 3 is anticipated to have a long-term capacity of 4,500 cfs, simultaneous release of 4,500 cfs of Restoration Flows to the Mendota Pool Bypass and conveyance of flood flows from the James Bypass would not be possible. The Secretary would prioritize flood control and water right delivery obligations over meeting flow targets for Restoration Flows, reducing Restoration Flows in these reaches if channel capacity is insufficient to meet conveyance of flood control or water delivery obligations in combination with Restoration Flows.

Modify Reach 4B1 to Convey at Least 475 cfs. Paragraph 11(a)(3) of the Settlement stipulates required channel modifications in Reach 4B to convey at least 475 cfs. Based on preliminary studies, these modifications are anticipated to include removing in-channel vegetation and modifying road crossings within Reach 4B1. Modifying Reach 4B1 could also include modifications to establish a low-flow channel to support fish migration, ranging from a single low-flow channel to a series of terraced channels to convey incremental low flows of up to 475 cfs or more.

Five road crossings are present in Reach 4B1 that could require modification. These include crossings at Washington Road, Turner Island Road, and three unnamed crossings. It is not known if modifications would be required at the Washington Road or Turner Island Road crossings to allow conveyance of at least 475 cfs or to provide fish passage. Currently, all three unnamed crossings are configured with culverts that may be insufficient to convey 475 cfs and/or may present barriers to upstream migrating adult salmon. Modifying Reach 4B1 could include modifying these road crossings to provide flow capacity and fish passage, as necessary. These modifications could include installing culverts, restructuring the channel, and/or constructing clear span bridges. Project-specific technical studies of these crossings would identify the type of modifications that would be necessary for flow and fish passage, and such modifications would be evaluated in subsequent environmental documents, as needed.

Modify San Joaquin River Headgate Structure to Enable Fish Passage and Flow Routing. Paragraph 11(a)(4) stipulates modifications to the San Joaquin River Headgate Structure to enable fish passage and flow routing of between 500 and 4,500 cfs into Reach 4B1. The Settlement stipulates that these modifications are to be made consistent with the decision on whether to route 4,500 cfs through Reach 4B1. Under all action alternatives, these modifications would be made sufficient to convey at least 475 cfs into Reach 4B1. Modifications to this structure are closely related to Restoration actions in Reach 4B1, described previously.

Modify Sand Slough Control Structure to Enable Fish Passage. The Sand Slough Control Structure could present a barrier to upstream migration of adult salmon. Modifications to the Sand Slough Control Structure for fish passage are stipulated in Paragraph 11(a)(5) of the

Settlement. Modifying the Sand Slough Control Structure could include modifying the structure for fish passage pursuant to Paragraph 11(a)(5) of the Settlement by removing the existing flume and replacing it with a gated structure. These modifications would be designed to not adversely affect flood conveyance capacity or functionality of the existing structure. Modifications to this structure are closely related to Restoration actions in Reach 4B1, described in a following section.

Screen Arroyo Canal and Provide Fish Passage at Sack Dam. Paragraph 11(a)(6) of the Settlement stipulates required modifications to Arroyo Canal to prevent entrainment of anadromous fish. Paragraph 11(a)(7) of the Settlement stipulates required modifications at Sack Dam for fish passage. Sack Dam currently provides the water surface elevation necessary for diversion at Arroyo Canal.

Diversions to Arroyo Canal range from zero to 800 cfs, and typically do not exceed 600 cfs. This action could include installing a screening device at the entrance to Arroyo Canal. The screen could be designed to operate with flows of up to 4,500 cfs in the river, while conveying flows into Arroyo Canal, to prevent entrainment of juvenile Chinook salmon in the canal. It also could include constructing a fish ladder at Sack Dam to allow flow and fish passage for a range of flows of up to 4,500 cfs.

Modify Eastside and Mariposa Bypasses to Enable Fish Passage. Paragraph 11(a)(8) of the Settlement stipulates modifications to structures in the Eastside and Mariposa bypass channels to provide anadromous fish passage on an interim basis until completion of Phase 2 actions described below. Paragraph 11(a)(9) of the Settlement stipulates modifications to the Eastside and Mariposa bypass channels to establish a suitable low-flow channel if the Secretary, in consultation with the RA, determines that such modifications are necessary to support anadromous fish migration through these channels. Because the function of the structures and the channel in these bypasses are related, modifications are described together in this section. Potential actions include the following:

- **Modify structures in Eastside and Mariposa bypasses to provide fish passage –**The Mariposa Bypass Bifurcation Structure at the head of the Mariposa Bypass would be modified to allow fish passage for a range of flows of up to 4,500 cfs. The Mariposa Bypass Drop Structure, at the downstream end of the Mariposa Bypass, presents a barrier to fish passage. Modifying the Mariposa Bypass Drop Structure could include constructing a fish ladder to allow upstream and downstream fish passage for a range of flows of up to 4,500 cfs.

- **Modify Eastside and Mariposa bypasses to provide fish passage under low flows –** The Eastside and Mariposa bypass channels were constructed with flat channel bottoms. Although scouring flows since construction have incised low-flow channels in some areas of the bypasses, some areas may not be passable by fish during low flows. The range of potential actions to provide fish passage under low flows could include no modifications, modifications to develop a single low-flow channel to convey at least 475 cfs, and a series of terraced channels to convey incremental low flows of up to 475 cfs.

Enable Deployment of Seasonal Barriers at Mud and Salt Sloughs. Potential false migration pathways to migrating adult salmon 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 false migration pathways, consistent with Paragraph 11(a)(10) of the Settlement.

Modify Chowchilla Bypass Bifurcation Structure. Paragraph 11(b)(2) of the Settlement stipulates modifications to the Chowchilla Bypass Bifurcation Structure to provide fish passage and prevent fish entrainment, if such modifications are necessary to achieve the Restoration Goal, as determined by the Secretary in consultation with the RA, and with the concurrence of National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). Gaps between the gates of the Chowchilla Bypass Bifurcation Structure allow some flow to leak through the gates, when closed. The gaps may be large enough to allow fish to pass through into the bypass, 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, modifying the Chowchilla Bypass Bifurcation Structure could include a range of potential actions, such as no modifications, monitoring and management of fish stranding under flood conditions, ranges of flows for screening the Chowchilla Bypass to prevent fish from entering the bypass, retrofitting the gates to prevent fish from passing through gaps between the closed gates, and/or adding an additional, screened gate to the structure. Modifications to this structure would be designed to not adversely affect the flood conveyance capacity or functionality of the existing structure.

Fill or Isolate Gravel Pits. Paragraph 11(b)(3) of the Settlement stipulates filling and/or isolating the highest priority gravel pits in Reach 1, based on their relative potential for reducing juvenile salmon mortality, as determined by the Secretary in consultation with the RA. Gravel pits could contribute to juvenile salmon mortality through effects on water temperatures and by providing habitat for predator species such as largemouth bass. A project-specific technical study would be necessary to identify the highest priority pits; therefore, this action has a potential range of actions, including no modifications, filling or isolating some or all pits, and regrading the floodplain to fill pits. Modifications to gravel pits could be implemented in connection with other potential Restoration actions described later in this chapter.

Salmon Reintroduction. Paragraph 14 of the Settlement addresses reintroducing spring-run and fall-run Chinook salmon between Friant Dam and the confluence of the San Joaquin River with the Merced River. Paragraph 14 states that, “in the event that competition, inadequate spatial or temporal segregation, or other factors beyond the control of the Settling Parties make restoring spring-run and fall-run Chinook salmon infeasible, then priority shall be given to restoring self-sustaining populations of wild spring run Chinook salmon.” The Secretary, through USFWS, and in consultation with the Secretary of Commerce, DFG, and the RA, will reintroduce spring- and fall-run Chinook salmon “at the earliest practical date after commencement of sufficient flows and the issuance of necessary permits.” To help facilitate reintroduction of salmon, the Fisheries Management Plan 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. 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.

The PEIS/R identifies potential system effects associated with reintroducing salmon. USFWS submitted a 10(a)(1)(A) Enhancement of Species Permit application to NMFS 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. Specific environmental effects related to the reintroduction of spring-run Chinook salmon would be addressed in the subsequent project-specific NEPA and CEQA analysis, in compliance with an associated Special Rule authorizing the experimental population.

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 adequate spawning gravel could include no modifications, augmenting and/or conditioning gravel at existing riffles, or establishing new riffles, as described below:

- **No modifications –** No actions would be taken to modify, augment, or condition gravel either at existing riffles or through establishing new riffles.

- **Augment existing riffles –** This action consists of augmenting existing riffles with clean, spawning-sized gravel at some of, or a portion of, the existing spawning areas in Reach 1.

- **Establish new riffles –** This action consists of establishing new riffles to increase and enhance salmonid spawning habitat in Reach 1.

Reduce Potential for Redd Superimposition and/or Hybridization. Spring-run Chinook salmon typically spawn earlier than fall-run Chinook salmon, creating the potential for redd superimposition, when fall-run Chinook salmon construct their redds on top of spring-run redds and dislodge or smother some of the spring-run eggs. In addition, a small percentage of fall-run Chinook salmon may spawn at the same time and location as spring-run Chinook salmon; therefore, potential may exist for hybridization. Hybridization may result in fish with migratory behaviors that are not viable in the San Joaquin River basin. The range of potential actions to reduce redd superimposition or hybridization includes no modifications, the deployment of seasonal barriers, and separate runs of salmon, and also could include potential operation and monitoring of the Hills Ferry Barrier on a seasonal basis.

The ability to control run timing via additional structures to separate spring- and fall-run Chinook salmon, as well as the ability to manage flows to prevent run overlap and hybridization,

is unknown. The location and design of barriers has yet to be determined; evaluation of spawning habitat availability and quality would likely guide this decision.

Supplement Salmon Population. Additional actions not identified in the Settlement could be necessary to supplement the naturally reproducing population, particularly in the years immediately following salmon reintroduction. The Settlement does not stipulate any actions to supplement the salmon population; therefore, a subsequent decision would be required before any such actions could be implemented. The range of potential actions to supplement the salmon population could include no supplementation, the release of hatchery fish to supplement the natural population for monitoring and management of the natural population, and/or release of hatchery fish to supplement the natural population when natural production is low. These actions are described in greater detail below. Subsequent studies would identify stock for hatchery populations and, as described for salmon reintroduction according to Paragraph 14 of the Settlement, stock for hatchery populations would likely come from a Central Valley population with behavioral and life history characteristics compatible with anticipated conditions on the San Joaquin River. As previously discussed, hatchery populations alone would not fulfill the Restoration Goal, and naturally reproduced individuals would need to be distinguished from hatchery-produced individuals.

- **No supplementation** – No actions would be undertaken to release fish into the San Joaquin River.

- **Release of hatchery salmon to supplement the natural population for monitoring and management** – This action consists of releasing study fish to support evaluations during implementation and monitoring, as needed.

- **Release of hatchery salmon to supplement the natural population for survival –** This action could consist of using hatchery fish to supplement the population in years when monitoring determines that the natural production of juvenile salmon is too low. This could occur during the relatively dry water year types (e.g., Settlement Critical-Low, Critical-High year types) when spring flows are either absent or inadequate to sustain Chinook salmon populations.

Modify Floodplain and Side-Channel Habitat. Additional actions not identified in the Settlement could be necessary to modify the floodplain or side-channel habitat beyond Reaches 2B or 4B1. Such modifications could benefit migrating salmon and other native fishes by providing additional food sources, increased protection from stranding, and other habitat improvements. The range of potential actions to modify floodplain and side-channel habitat outside Reaches 2B and 4B1 could include no modifications; creating and/or enhancing additional floodplain habitat; creating, enhancing, or isolating side channels; and/or reducing sand transport.

- **No modifications** – No modifications would be undertaken to modify the floodplain and side-channel habitat.

- **Create and/or enhance additional floodplain habitat –** This action could consist of creating and/or enhancing additional floodplain habitat outside Reaches 2B and 4B1

(floodplain modifications in these reaches are described previously as actions stipulated by the Settlement) to provide flexibility to accommodate variable life history strategies of future salmon populations, which may vary 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. This action also includes floodplain modifications in reaches other than Reach 2B and Reach 4B1 to provide for the maintenance of floodplain vegetation at a level to be determined based on the associated contribution toward achieving the Restoration Goal.

- **Create, enhance, or isolate side channels –** Side channels occur throughout the river, some with perennial connectivity to the main channel, but most with connectivity only under high-flow conditions. In some cases, side channels could provide suitable rearing habitat for juvenile salmon, or serve as holding habitat for adult salmon, while other side channels may foster conditions that are unsuitable for salmon, including high temperatures and habitat for predatory species such as largemouth bass. Side-channel enhancement activities could include dredging or widening side channels. Side-channel isolation could consist of filling a channel or constructing berms across the mouth of a channel. Additionally, new side channels could be created to provide additional habitat, if necessary. Creation of new side channels could likely be accomplished through dredging new channels or removing sediment blocking the connectivity of former channels.

- **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 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 would incorporate channel modifications to provide salmon habitat, including instream cover such as undercut banks, overhanging vegetation, boulders, large wood, surface turbulence, and features providing refuge from predation. The range of potential actions to enhance in-channel habitat could include no modifications, augmenting existing, and/or creating new, in-channel habitat. Enhancing in-channel habitat could also include modifications such as constructing pools, or dredging and grading to develop or maintain more desirable water temperatures. Deep pools remain cooler during warm summer months, and provide refuge from avian and terrestrial predators. Additional assessments would be conducted to identify the potential for groundwater influence on instream temperatures, and

whether water temperature requirements may be met under different conditions and/or different timing of flow releases from Friant Dam.

Reduce Potential for Aquatic Predation of Juvenile Salmonids. Additional actions not identified in the Settlement could be necessary to prevent aquatic predation of juvenile salmonids. Additional potential actions to prevent aquatic predation of juvenile salmonids could include capturing and removing nonnative aquatic predatory species.

Reduce Potential for Fish Entrainment. Unscreened and poorly screened small diversions can entrain migrating juvenile fish. The Settlement does not stipulate actions to screen these small diversions. The range of potential actions to prevent fish entrainment at small diversions could include not screening diversions, or installing or modifying screens at small diversions throughout the Restoration Area. The number of screens installed would be determined through future studies, but could be based on the relative impact of individual diversions to fisheries.

Enable Fish Passage. Obstacles to the successful migration of anadromous fish in the Restoration Area could include hydraulic conditions at road crossings; small San Joaquin River tributaries with unsuitable habitat for salmon spawning and rearing; hydraulic conditions in the river channel at low flow; and other physical features within the river. The range of potential actions to enable fish passage beyond the actions stipulated in the Settlement could include no modifications, establishing and/or maintaining low-flow channels, trapping and hauling juveniles and adults, modifying road crossings, and installing barriers to prevent straying.

- **No modifications** – No actions would be undertaken to enable fish passage.

- **Establish and/or maintain low-flow channels** – This action consists of modifying the channel in reaches outside the Eastside and Mariposa bypasses and Reach 4B1 to provide passage during low-flow conditions, as needed. As described above for the action to enhance in-channel habitat through reducing sand transport, establishing and/or maintaining low-flow channels could include bed stabilization in areas where the bed is degrading, and bank stabilization in meandering reaches. Removing in-channel sand to maintain a low-flow channel could be accomplished by dredging or grading. The range of actions described above for modifications to floodplain and side-channel habitat, such as managing invasive vegetation and creating and/or enhancing additional floodplain habitat, could also be applied to establish and/or maintain low-flow channels through bed and bank stabilization.

- **Trap and haul –** It may be necessary to implement a trap-and-haul operation to sustain Chinook salmon within the Restoration Area if protective features are not completed in time to reintroduce fish, if it is determined that entrainment and physical barriers exist that could hinder reintroducing and managing fish populations, or if river connectivity is disrupted (i.e., in critical water years). Implementing a trap-and-haul program could consist of trapping salmon smolts in upper reaches (likely Reach 1 or Reach 2) to transport smolts to downstream reaches for release, thereby avoiding temporary undesirable habitat conditions (such as high temperatures or discontinuous flow). In addition, implementing a trap-and-haul program could include trapping adult salmon in downstream reaches and transporting them to Reach 1, thereby avoiding temporary

undesirable habitat conditions in intermediate reaches. Several trapping mechanisms could be applied under this action, including passive and active capture techniques. Trapped fish could be transported under controlled conditions by truck to suitable habitat areas and released. Trap-and-haul operations are not envisioned as a long-term management strategy, and would only be used as temporary measure if protective features are not completed in time to reintroduce fish, if it is determined that entrainment and physical barriers exist that could hinder reintroducing and managing fish populations, or if river connectivity is disrupted.

- **Modify road crossings –** This action consists of modifying road crossings to provide for fish passage in Reach 1. These crossings could be modified through installing culverts, restructuring the channel, and/or constructing clear span bridges to enable the crossings to be used during Restoration Flows while providing fish passage. Road crossings in Reaches 2B and 4B that pose potential barriers to fish passage are discussed as possible actions to address Settlement Paragraphs 11(a)(2) and 11(a)(3), respectively.

- **Install barriers to prevent straying –** This action could consist of installing temporary or permanent barriers in the channel to prevent fish from straying into tributaries, flood bypasses, or river reaches with undesirable habitat conditions. The primary categories of permanent fish barrier structures are picket barriers, velocity barriers, and vertical drop structures. Tributaries, flood bypasses, and river reaches that could be screened under this action depend in part on the flow-routing decision made consistent with Paragraph 11(b)(1) of the Settlement, but could include, but may not be limited to, Dry and Cottonwood creeks in Reach 1; Deadmans, Bear, and Owens creeks in the Eastside Bypass; the downstream end of Eastside Bypass Reach 2; the downstream end of Reach 4B; and the downstream end of Eastside Bypass Reach 3.

Modify Flood Flow Control Structures. Additional actions not identified in the Settlement could be necessary to improve fish passage and flow conveyance at flood control structures within the Restoration Area, including modifications to the Chowchilla Bypass Bifurcation Structure, Sand Slough Control Structure, and structures in the Eastside and Mariposa bypasses. The range of potential additional actions to modify flood control structures could include no modifications, retrofitting gates at flood control structures to prevent flow loss, and installing grade control structures to address backwater effects of the Chowchilla Bypass Bifurcation Structure.

- **No modifications** – No actions would be undertaken to modify flood flow control structures.

- **Retrofit gates –** As described for the range of actions to address Paragraph 11(b)(2) of the Settlement, gaps between the gates of the Chowchilla Bypass Bifurcation Structure allow some flow to leak through the gates, when closed. Because of the current function of the structure in routing relatively large flows under flood conditions, the small amount of water lost through closed gates at this and other gated flood control structures in the system (including the San Joaquin River Headgates, Eastside Bypass Bifurcation Structure, and Mariposa Bypass Bifurcation Structure) is not a concern under current operations. However, during the release of Interim and Restoration flows, the loss of

water from the main stem San Joaquin River through the closed gates to the bypass channel could inhibit success of the Restoration Goal by reducing the amount of water flowing to downstream reaches. Potential actions to address flow loss range from no retrofit implementation to retrofitting the gates on the existing flood control structures to prevent flow from passing the closed gates.

- **Install grade control structures –** Local backwater effects caused by the Chowchilla Bypass Bifurcation Structure may be contributing to the accumulation of sand in Reach 2A, which could mobilize under Interim or Restoration flows, thereby compromising the ability to convey Interim or Restoration flows through downstream reaches. The Settlement does not stipulate any actions to modify the Chowchilla Bypass Bifurcation Structure to address flow loss or sediment deposition due to backwater effects; therefore, a subsequent decision would be required before any such actions could be implemented. Potential actions to address sediment deposition upstream from the Chowchilla Bypass Bifurcation Structure range from no implementation to installing grade control structures to prevent sediment mobilization.

1.3 Physical Monitoring and Management Plan

The Physical Monitoring and Management Plan was included in the Draft PEIS/R as Appendix D, and is summarized here. The Physical Monitoring and Management Plan provides guidelines for observing and adjusting to changes in physical conditions within the Restoration Area. The Physical Monitoring and Management Plan consists of five component plans, addressing interrelated physical conditions including flow, groundwater seepage, channel capacity, propagation of native vegetation, and suitability of spawning gravel. Each component plan identifies objectives for the physical conditions within the Restoration Area, and provides guidelines for the monitoring and management of those conditions. The plans identify potential actions that could be taken to further enhance the achievement of the objectives. The component plans include immediate actions that could be taken, which are analyzed at a project level in the PEIS/R. The component plans also include long-term actions that are analyzed at a program level of detail in the PEIS/R. Finally, this Plan includes a description of monitoring activities that 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
- **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) responses

that could be implemented to attain the management objectives, if necessary. Monitoring activities and responses are described below. Monitoring and management guidelines related to biological conditions for fish are separately described in Appendix E of the Draft PEIS/R, "Fisheries Management Plan."

Monitoring Activities

Monitoring activities include past, present, and future physical and nonphysical activities within the Restoration Area. Site-specific documentation has been completed for those actions completed or currently underway, and would be completed as necessary for those actions described at a program level of detail in the PEIS/R. Monitoring activities, as described in the Physical Monitoring and Management Plan, are guidelines for monitoring and could change as part of implementation of the Settlement. These activities include the following:

- **Flow monitoring** – Flow, cross sections, and surface water stage at six gaging stations, and at additional locations during high-flow events
- **Groundwater level monitoring** – Groundwater elevation in monitoring wells
- **Aerial and topographic surveys** – True color aerial photographs and topographic surveys to assess river stage, hydraulic roughness, river width, bed elevation, and vegetation conditions
- **Vegetation surveys** – Surveys of seed dispersal start and peak times, and native riparian vegetation establishment
- **Sediment mobilization monitoring** – Sediment mobilization, bar formation, and bank erosion through aerial and topographic surveys of areas with elevated erosion potential
- **Spawning gravel monitoring** – Pebble count or photographic surveys of riffles following Normal-Wet or Wet years

Immediate Management Actions – Project Level

Potential immediate responses have been identified to contribute to attaining the seepage, channel capacity, and spawning gravel management objectives. No immediate responses have been identified to contribute to attaining the flow or vegetation management objectives. Potential immediate responses to attain the groundwater seepage, channel capacity, and spawning gravel management objectives include the following:

- **Seepage –** Reduce, redirect, or redivert Interim or Restoration flows to reduce flow in downstream reaches. This could include the following:
  - **Reductions of Interim or Restoration Flow Releases at Friant Dam** – Reductions in the release rate from Friant Dam to limit the potential for seepage impacts to occur downstream. Planned thresholds for reductions at Friant would need to consider travel time and associated response delays.

- **Redirection of Interim or Restoration Flows at Chowchilla Bypass Bifurcation Structure** – Directing flow into the bypass system at the Chowchilla Bypass Bifurcation Structure would reduce flow in Reach 2B and downstream reaches.

- **Delivery of Interim or Restoration Flows at Mendota Pool** – Delivery of water to Mendota Pool would reduce flows in Reach 3 and downstream reaches.

- **Delivery of Interim or Restoration Flows at Arroyo Canal** – When San Luis Canal Company is not diverting at the full capacity of Arroyo Canal, additional water diversions to the canal would reduce flows in Reach 4A and downstream reaches.

- **Redirection of Interim or Restoration Flows at Sand Slough Control Structure** – During the first year of Interim Flows, water would not be directed into Reach 4B. In subsequent years, diverting flows into the bypass system at Sand Slough Control Structure would reduce flows in Reach 4B.

- **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).

Long-Term Management Actions – Program Level

Potential long-term responses have been identified to contribute to attaining the flow, groundwater seepage, channel capacity, native vegetation, and spawning gravel management objectives. Potential long-term responses to attain the management objectives may require additional environmental documentation, and include the following:

- **Flow** – Paragraph 13(c) of the Settlement provides for adjusting releases due to unexpected seepage losses. These actions could include but would not be limited to acquisition and release of purchased water from willing sellers. The procedures for purchasing and releasing additional water are under development and would 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).

- **Seepage –** Long-term management actions for seepage may include, but would not be limited to, purchasing easements and/or compensation for seepage effects, construction of slurry walls to reduce seepage flows, construction of seepage berms to protect against levee failure, construction of drainage interceptor ditches to protect affected lands, or installation of tile drains on affected lands.

- **Channel capacity –** Long-term management actions for channel capacity may include, but would not be limited to, providing a larger floodplain between levees through the acquisition of land and construction of setback levees, regrading of land between levees, construction of sediment traps, construction of grade control structures, or channel grading.

- **Native vegetation –** Long-term management actions for native vegetation may include, but would not be limited to, active plantings and irrigation of desired native plants.

- **Spawning gravel –** Long-term management actions for spawning gravel may include, but would not be limited to gravel augmentation and/or conditioning at existing riffles, establishment of new riffles, engineered channel modifications, construction of sediment traps on the San Joaquin River or tributaries with high sediment loads, or construction of grade control structures.

1.4 Conservation Strategy

As part of Settlement implementation, a comprehensive strategy for the conservation of listed and sensitive species and habitats has been prepared, and would be implemented in coordination with USFWS, NMFS, and DFG. The strategy's purpose is to serve as a tool built into the project description to minimize and avoid potential impacts to sensitive species and habitats. This Conservation Strategy guides development and implementation of specific conservation measures for project- and program-level actions. The Conservation Strategy includes conservation goals and measures for species and communities (such as avoidance, minimization, monitoring, and management measures) consistent with adopted recovery plans, as described below. If avoidance and minimization measures are impractical or infeasible, then further consultation actions and mitigation measures will be pursued and developed in coordination with the appropriate regulatory agency.

To achieve the Restoration Goal, a number of actions that are proposed to be implemented may substantially alter not only the aquatic ecosystem of the San Joaquin River, but also the river's riparian and wetland ecosystems, and some adjacent upland ecosystems. Riparian, wetland, and upland ecosystems of the Central Valley, such as those along the San Joaquin River, provide habitat for a large number of species, including several federally listed and State-listed species. Therefore, the action alternatives include this Conservation Strategy, which would be implemented in a manner that is consistent with adopted conservation plans for sensitive species, and for wetland and riparian ecosystems of the Restoration Area.

The Conservation Strategy consists of management actions that would result in a net benefit for riparian and wetland habitats in the Restoration Area, to avoid reducing the long-term viability of sensitive species, and to be consistent with adopted conservation plans. The goals of the strategy are described below:

- **Conserve riparian vegetation and waters of the United States, including wetlands** – It is anticipated that implementing the Settlement would result in a net increase in the acreage of riparian and wetland vegetation in the Restoration Area. However, several

program actions may disturb or eliminate riparian vegetation or waters of the United States (including wetlands). If impacts to waters of the United States (including wetlands), navigable waters, or the Federal levee system cannot be avoided, a USACE Section 404, Section 408, and/or Section 10 permit and Central Valley Regional Water Quality Control Board (RWQCB) Section 401 water quality certification would be obtained. Increased acreage of wetlands resulting from Interim and Restoration flows may be considered a means of replacing, restoring, or enhancing wetlands. However, the acreage, location, and methods of replacing, restoring, or enhancing wetlands would be determined during these permitting processes.

- **Control and manage invasive species** – Because of their adverse effects on aquatic and riparian ecosystems, the spread of invasive plant species as a result of release of Interim and Restoration flows would be controlled and managed. For each invasive plant species with known infestations, thresholds for management responses and specific management responses would be established and implemented (including species-specific control methods).

- **Conserve special-status species** – Populations of special-status species would benefit from restoring and sustaining riparian and wetland habitat, and controlling invasive species, as described previously. However, during the initiation of Interim and Restoration flows, and the construction of related actions, a variety of special-status species of upland, wetland, and riparian habitats could experience adverse effects. Therefore, this strategy includes measures to prevent or reduce impacts that could result from loss of habitat within project footprints or from impacts on adjacent habitat or species. In addition, this strategy includes coordination with appropriate regulatory agencies to provide mitigation or compensation, consistent with applicable conservation plans, to avoid or minimize effects when actions would result in a net loss of habitat or other substantial adverse effects, if the implementation of avoidance and minimization measures is infeasible or impractical.

These measures address all potentially affected federally listed and/or State-listed species, and all other species identified by USFWS, NMFS, or DFG as candidates, sensitive, or special-status in local or regional plans, policies, or regulations. For individual project- and program-level actions under each of the action alternatives, the applicable, feasible measures would guide development of action-specific conservation strategies. Table A1 presents the Conservation Strategy.

Table A1.
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 A1.
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 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	Project and Program	USFWS

Table A1.
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
	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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 the 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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 and will include trees within ¼ mile of project construction activities. 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 A1.
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 A1.
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 A1.
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 A1.
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 A1.
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 the Draft PEIS/R).	Project and Program	USACE

Table A1.
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 the 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 the 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 the Draft PEIS/R) will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of the 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 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 A1.
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 A1.
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 A1.
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 A1.
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

1.5 Settlement Implementation

Implementation of the Settlement began in October 2006, with Court approval of the Settlement and subsequent formation of the SJRRP. Implementation of physical actions to implement the Settlement began in 2009, with the installation of stream flow gages and monitoring wells, the release and recapture of Interim Flows and establishment of the RWA in October 2009. Site-specific documentation was completed as necessary for actions completed or currently underway, and would be completed, as necessary, for actions described at a program level of detail.

The RA has an integral role in implementing the Settlement. The RA's duties are defined in the Settlement, and include making recommendations to the Secretary on the release of Interim and Restoration flows. The RA is also responsible for consulting with the Secretary on implementing Paragraph 11 actions, and for identifying and recommending additional actions under Paragraph 12, as described previously. In addition, the RA is responsible for consulting with the Secretary on the reintroduction of Chinook salmon under Paragraph 14. The RA's recommendations would be taken into consideration by the Secretary in making decisions or specific actions to be implemented under the Settlement.

Before the release of Interim and Restoration flows, several actions would be completed by Reclamation, including estimating channel capacity restrictions throughout the 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 flows. Reclamation would verify the Interim or Restoration flow schedule provided by the RA for consistency with the Settlement, system capacity and water supply demand estimates, and applicable environmental compliance documents and approvals. Reclamation would then allocate water supply for Interim or Restoration flows based on the RA's schedule and on hydrologic conditions (i.e., water year type).

Before and during release of Interim or Restoration flows, Reclamation would implement the components of the plans, mitigation measures, and permit and approval conditions, as described in this project description and in the Appendix B of this ROD and in any permits or approvals issued for implementing the Settlement. In coordination with State and local agencies, Reclamation would monitor and manage the response of the system during release of Interim and Restoration flows, and reduce or redirect flows, as necessary and as previously described, to avoid and minimize impacts.

1.5.1 Strategies for Implementation

This section describes several strategies that would be employed throughout implementation of the Settlement, including the following:

- Grouping of site-specific projects
- Estimating then-existing channel capacities for implementing Interim and Restoration flows in response to monitoring results and project implementation
- Updating operating guidelines and obtaining biological clearance and other agreements

Grouping Site-Specific Projects

Alternative C1 includes several channel and facility modifications that would be implemented to increase channel capacity and improve fish passage in the Restoration Area. Because some of these projects have hydraulic and other physical interdependencies, implementation would be accomplished by combining related projects into groups. Project planning, environmental compliance, permitting, design, and construction would be coordinated for projects in each group.

Estimating Then-Existing Channel Capacities for Implementing Interim and Restoration Flows

Release of Interim and Restoration flows would occur over time and would be constrained by channel capacity, among other factors. As channel capacity limitations and other factors are addressed, the SJRRP would implement additional actions (such as Paragraph 11(b) and Paragraph 12 actions) and/or increase Interim and Restoration flows up to the amounts specified in the Settlement. Throughout implementation of the Settlement, Reclamation, through coordination with the Channel Capacity Advisory Group as previously described, would estimate then-existing channel capacities in the Restoration Area. Reclamation would provide estimates of then-existing channel capacities to the RA, to allow the RA to incorporate those estimates in the RA's recommendations for Interim and Restoration flow schedules.

The SJRRP is being implemented concurrently with other programs by other agencies that would modify the San Joaquin River and the Lower San Joaquin River Flood Control Project to address flood protection needs. In particular, DWR is characterizing the condition of levees along the San Joaquin River and the bypasses in the Restoration Area through the Non-Urban Levee Evaluation Program as part of the California FloodSAFE initiative. Initial findings from these evaluations indicate deficiencies in flood conveyance capacity at several locations in the Restoration Area that were not identified for channel improvements in the Settlement. Channel improvements to address these deficiencies in flood protection have not yet been identified and evaluated, and are not included in the Settlement (and therefore are not part of Alternative C1).

Potential channel improvements to increase channel capacity for reaches not specified in the Settlement may be implemented by parties other than Reclamation to improve levee integrity for conveyance of flood flows irrespective of Settlement implementation. Such modifications could include levee setbacks; cutoff/slurry walls; levee strengthening, widening, and raising; and channel dredging or other techniques to increase channel capacity. These types of future projects would provide flood control benefits and would be expected to have independent utility outside of the implementation of the Settlement as DWR evaluates levee conditions along the San Joaquin River and the bypasses in the Restoration Area through the Non-Urban Levee Evaluation Program as part of the California FloodSAFE initiative. Because these potential future levee and channel modifications are not specified in the Settlement, they are not part of the SJRRP and are not included as part of Alternative C1. Specific future modifications to the flood control system under the FloodSAFE initiative are uncertain and speculative, and are not considered reasonably foreseeable or probable future actions at this time. Reclamation and DWR recognize the importance of coordination and communication in planning and implementing projects that affect the flood control system in order to prevent impacts to flood management. Therefore, the potential for cumulative effects associated with implementation of the Settlement

and FloodSAFE programs and projects is presented in Chapter 26.0 of the Draft PEIS/R, "Cumulative Impacts."

Updating Operating Guidelines, Agreements, and Approvals

The LSJLD operates and maintains the flood management system and is financially supported through landowner assessments. The change in operations at Friant Dam and the routing of Interim and Restoration flows could result in increased operations and maintenance activities, including increased flap gate inspection and debris removal, operation of flow control structures, levee patrols, vegetation control, and sand excavation (these actions are as described under "Physical Monitoring and Management Plan"). Reclamation is currently working with LSJLD to develop a financial assistance agreement to offset costs associated with conducting increased operation and maintenance activities as a result of implementing the Settlement.

The change in operations at Friant Dam and the routing of Interim and Restoration flows also would likely result in the need for revisions to existing guidelines for the operation of flood management and water diversion facilities, including guidelines for splitting Interim and Restoration flows at bifurcation structures. In addition, a revised plan of flood control may be required that incorporates these guidelines and changes in operations. Reclamation may make recommendations for these revisions. Subsequent site-specific studies and structural modifications associated with program-level actions would likely result in recommendations for additional revisions to the guidelines at the time those studies are completed. However, LSJLD would continue to operate the flood management system and, in coordination with CVFPB, would be responsible for development of the necessary agreements and revisions.

Before Interim and Restoration flows can be increased based on the estimate of then-existing capacities, the Implementing Agencies would obtain any additional necessary regulatory compliance for biological resources. In some reaches of the river and bypass system, field surveys would be required to determine if listed species are present. Biological resources surveys would be designed and scheduled to provide information relevant to contemplated changes in flow during the time frame that survey results would be valid. Survey results would be used to determine maximum flows that could be conveyed based on biological conditions. Until appropriate conservation measures can be implemented, flows would be limited to levels that would not adversely affect listed species.

1.6 References

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ATTACHMENT B:
Environmental Commitment Plan and Tracking Program

The San Joaquin River Restoration Settlement Act (Act), Public Law 111-11, authorizes and directs the Secretary of the Interior (Interior) to implement the Stipulation of Settlement (Settlement) in *NRDC, et al., v. Kirk Rodgers, et al*. Section 10004(d) of the Act states the following:

> *MITIGATION OF IMPACTS – Prior to the implementation of decisions or agreements to construct, improve, operate, or maintain facilities that the Secretary determines are needed to implement the Settlement, the Secretary shall identify –*
>
> *(1) The impacts associated with such actions; and*
>
> *(2) The measures which shall be implemented to mitigate impacts on adjacent and downstream water users and land owners.*

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) prepared a joint Program Environmental Impact Statement/Report (PEIS/R) with the California Department of Water Resources (DWR) for the San Joaquin River Restoration Program (SJRRP). The PEIS/R identifies environmental impacts, environmental commitments, and mitigation measures related to implementation of the Preferred Alternative, Alternative C1 (Reach 4B1 at 475 cubic feet per second, New Pumping Plant Recapture). This Environmental Commitment Plan and Tracking Program (Environmental Commitment Plan) is to be used by Reclamation to ensure that all environmental commitments and mitigation measures described in the PEIS/R for Alternative C1 are implemented in a satisfactory manner and that implementation is documented.

This Environmental Commitment Plan includes measures for both program-level and project-level actions. Environmental commitments and mitigation measures for project-level actions address the following aspects of the Preferred Alternative: release, conveyance, and recapture of Interim and Restoration flows; monitoring and management actions related to flows; and project-level conservation measures. Environmental commitments and mitigation measures for program-level actions address all other actions. As specific information is not yet known on these actions, it is not possible to precisely assess future impacts and determine appropriate commitments or mitigation measures at this time; therefore, the PEIS/R treats a number of program-level impacts as potentially significant to ensure that commitments and mitigation measures are applied to avoid, minimize, rectify, reduce, eliminate, or compensate for potentially significant or significant impacts. Not all future site-specific projects will result in all of the impacts identified in the PEIS/R; therefore, some program-level commitment and mitigation measures may not apply to some future actions. During future project-level evaluations of specific actions, the program-level mitigation measures would be reevaluated for applicability based on project-specific information. Each applicable measure would be refined as necessary to apply to the specific project or would be replaced with an equivalent measure. The final measures would then be incorporated into a project-specific Environmental Commitment Plan. Future

commitments and mitigation measures may be modified, refined, or improved over time based on experience implementing various measures, on the results of scientific studies, or on other relevant sources of information.

The project description itself for the Preferred Alternative, Alternative C1, provides several implementation commitments that will be monitored and tracked in order to ensure their completion and efficacy. This Environmental Commitment Plan and Tracking Program is provided in Table B1 and includes a timeline for implementation, responsible agency, and columns for tracking completion of the work. The table contain the following information:

- **Environmental Commitment** – Lists the commitment as described in the PEIS/R project description and identifies whether the commitment applies to program-level or project-level actions. Provides a specific identifying number for easy reference (i.e., EC-2).

- **Timing/Schedule** – Lists the timeframe in which the commitment is expected to be implemented.

- **Agency Responsible** – Identifies the entity responsible for implementing the commitment (i.e., Reclamation, DWR, or others, as appropriate).

- **Completion of Implementation** – Each project proponent is responsible for reporting on implementation of the environmental commitments, as appropriate. The "Action" column is to be used to describe the action(s) taken. The "Date of Completion" column is to be used to indicate when implementation of the commitment has been completed.

The Mitigation Commitment Plan and Tracking Program is presented in Table B2, below, in a similar tabular format. The Mitigation Commitment Plan and Tracking Program identifies specific mitigation measures described in the PEIS/R for program- and project-level environmental impacts from the implementation of the Preferred Alternative. These actions present mitigation to be implemented in order to offset or lessen specific environmental impacts identified in the PEIS/R.

Table B1.
Environmental Commitment Plan and Tracking Program for the San Joaquin River Restoration Program

Environmental Commitment	Timing and Schedule	Agency Responsible	Action	Date of Completion
EC-1: Establish a Channel Capacity Advisory Group (CCAG) and determine and update estimates of then-existing channel capacities.	Establishment of CCAG prior to releasing Interim Flows in Water Year 2013. First draft report related to potential flow increases submitted to CCAG within one year of signing of this ROD. CCAG will have a 60-day review and comment period. Reclamation would review comments and issue a final report within 60 days of the close of the draft report review period. Annual reporting thereafter or when needed as determined by CCAG; CCAG would convene until 2030, but may stop earlier if then-existing channel capacities are determined to equal or exceed the maximum Restoration Flows through the Restoration Area. If channel capacities remain below those able to convey full Restoration Flows, the CCAG may continue to convene as needed.	Reclamation		
EC-2: Maintain Interim and Restoration flows below estimates of then-existing channel capacity (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).	For the duration of the SJRRP. Interim or Restoration flows would not increase above previously-determined then-existing channel capacities until 10 days after the final report is distributed to the CCAG (see commitment EC-1 above).	Reclamation		
EC-3: Monitor erosion and perform maintenance and/or reduce Interim and Restoration flows as necessary to avoid erosion-related impacts. On-going monitoring of levee conditions, including observations for erosion, seepage, boils, impaired emergency levee access, or other indications of flood risk. Field surveys of potential erosion sites would be conducted annually. Erosion management could include routine maintenance by the Lower San Joaquin Levee District. If increased maintenance or costs are required, Reclamation would conduct the maintenance or enter into an agreement for others to conduct the work.	For the duration of the SJRRP.	Reclamation		

Table B1.
Environmental Commitment Plan and Tracking Program for the San Joaquin River Restoration Program

Environmental Commitment	Timing and Schedule	Agency Responsible	Action	Date of Completion
EC-4: Reduce or discontinue Interim and Restoration flows as needed in times of flood control releases. If release of water from Friant Dam is required for flood control purposes, concurrent Interim and Restoration flows would be reduced by an amount equivalent to the required flood control release. If flood control releases exceed the concurrent scheduled Interim and Restoration flows, no additional releases above those required for flood control would be made for SJRRP purposes.	For the duration of the SJRRP.	Reclamation		
EC-5: Reduce Interim and Restoration flows as necessary for delivery to San Joaquin River Exchange Contractors (Exchange Contractors). If Reclamation determines that deliveries cannot be made to the Exchange Contractors via the Delta-Mendota Canal, deliveries could be made through the San Joaquin River, consistent with Contract Ilr-1144. Therefore, Interim and Restoration flows would be reduced as necessary to provide channel capacities needed for water delivery to the Exchange Contractors from the San Joaquin River.	For the duration of the SJRRP.	Reclamation		
EC-6: Pursue agreements with DWR, Friant Division long-term contractors, and other south-of-Delta Central Valley Project (CVP)/State Water Project (SWP) contractors to recirculate Interim and Restoration flows.	As needed for the duration of the SJRRP.	Reclamation		
EC-7: Implement immediate measures identified in the Physical Monitoring and Management Plan related to flow, seepage, channel capacity, native vegetation, and spawning gravel.	On-going. Immediate management actions identified in the Physical Monitoring and Management Plan would be implemented as needed.	Reclamation		

Table B1.
Environmental Commitment Plan and Tracking Program for the San Joaquin River Restoration Program

Environmental Commitment	Timing and Schedule	Agency Responsible	Action	Date of Completion
EC-8: Implement and prepare appropriate environmental documentation for long-term management actions identified in the Physical Monitoring and Management Plan related to flow, seepage, channel capacity, native vegetation, and spawning gravel.	On-going. Long-term management actions identified in the Physical Monitoring and Management Plan would be implemented as appropriate.	Reclamation		
EC-9: Implement the Steelhead Monitoring Plan in coordination with NMFS.	On-going. When SJRRP Interim and Restoration flows connect the upper San Joaquin River to the lower San Joaquin River, below the Merced River, Reclamation will continue to implement the Steelhead Monitoring Plan (SMP). The SMP will be implemented from the time the Hills Ferry Barrier is removed each year (approximately December 1) through March 15, as needed and in coordination with NMFS. This work will continue until such time as no longer needed, as determined in concert with NMFS.	Reclamation		
EC-10: Implement project- and program-level actions identified for listed and sensitive species and habitats as identified in the Conservation Strategy (Table A1 of the ROD or Table 2-7 of the PEIS/R).	On-going. Activities identified in the Conservation Strategy will continue to be implemented as-needed and in coordination with the appropriate regulatory agencies.	Reclamation and DWR		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
4.0 Air Quality					
AIR-1 Program	**Prepare Project-Level Quantitative Analysis of Construction-Related Emissions and Implement Measures to Minimize Emissions.** The project proponent will implement the measures described below for all future construction-related actions to quantify construction-related emissions for each future action, and identify and implement measures to reduce or minimize impacts. The project proponent will obtain the necessary information to perform a complete quantitative project-level air emissions analysis as part of the subsequent environmental review for each construction project for which such review is required. The air quality analysis for each individual project will be based on the types, locations, numbers, and operations of equipment to be used; the amount and distance of material to be transported; and worker trips required. Each analysis will determine whether emissions exceed the San Joaquin Valley Air Pollution Control District (SJVAPCD) standards and will require the project proponent to implement all emission reduction measures. The project proponent will incorporate the performance standards described below into all future project designs and adhere to them. Reduction of Ozone Precursor Emissions During Construction. The project proponent will design future projects to comply with the following general mitigation requirements for construction emissions, as contained in SJVAPCD Rule 9510, “Indirect Source Review” (ISR): • Exhaust emissions for construction equipment of greater than 50 horsepower that is used by, or associated with, the project will be reduced by 20 percent of the total oxides of nitrogen (NOX) and by 45 percent of the total particulate matter with an aerodynamic resistance diameter of 10 micrometers or less (PM10) exhaust emissions from the statewide average, as estimated by the Air Resources Board. Construction emissions may be reduced on site by using add-on controls, cleaner fuels, or newer lower-emissions	During project-level planning, design, and permitting	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	equipment, thus generating less pollution. • Additional strategies for reducing construction emissions, including, but not limited to, the following: - Providing sufficient commercial electric power to the project site to avoid or minimize the use of portable electric generators. - Substituting electric-powered equipment for diesel engine-driven equipment. - Limiting the hours of operation of heavy-duty equipment and/or the amount of equipment used at any one time. - Minimizing idling time (e.g., 10-minute maximum). - Replacing equipment that uses fossil fuels with electrically driven equivalents (provided that they are not run via a portable generator set). Reduction of Particulate Emissions During Construction. The project proponent will design future projects to comply with SJVAPCD's Regulation VIII, "Fugitive Dust PM_{10} Prohibitions," and will implement all applicable control measures. Regulation VIII contains the following required control measures, among others: • Prewater the site enough to limit visible dust emissions (VDE) to 20 percent opacity. • Phase the work to reduce the amount of surface area disturbed at any one time. • During active construction: - Apply enough water or chemical/organic stabilizers or suppressants to limit VDE to 20 percent opacity. - Construct and maintain wind barriers sufficient to limit VDE to 20 percent opacity. Apply water or chemical/organic stabilizers or suppressants to unpaved access/haul roads and unpaved				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	vehicle/equipment traffic areas in sufficient quantity to limit VDE to 20 percent opacity and meet the conditions of a stabilized unpaved road surface. • Limit the speed of vehicles traveling on uncontrolled, unpaved access/haul roads within construction sites to a maximum of 15 miles per hour (mph). • Post speed-limit signs meeting the standards of the U.S. and California departments of transportation at the entrance to each construction site's uncontrolled, unpaved access/haul road. Speed-limit signs will also be posted at least every 500 feet and will be readable in both directions of travel along uncontrolled, unpaved access/haul roads. • When handling bulk materials: - Apply water or chemical/organic stabilizers or suppressants in sufficient quantity to limit VDE to 20 percent opacity. - Construct and maintain wind barriers sufficient to limit VDE to 20 percent opacity and with less than 50 percent porosity. • When storing bulk materials: - Comply with the conditions for a stabilized surface, as listed above. - Cover bulk materials stored outdoors with tarps, plastic, or other suitable material and anchor the covers to prevent their removal by wind action. - Construct and maintain wind barriers that are sufficient to limit VDE to 20 percent opacity and that have less than 50 percent porosity. If using fences or wind barriers, apply water or chemical/organic stabilizers or suppressants to limit VDE to 20 percent opacity, or use a three-sided structure that is at least as high as the storage pile and				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	has less than 50 percent porosity. • Load all haul trucks such that the freeboard is not less than 6 inches when material is transported across any paved public-access road. Freeboard should be sufficient to limit VDE to 20-percent opacity. • Apply enough water to the top of the load to limit VDE to 20 percent opacity. • Cover haul trucks with a tarp or other suitable cover. • Clean the interior of the cargo compartment or cover the cargo compartment before an empty truck leaves the site. • Prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved-surface exit point of a site. • Clean up carryout and trackout using one of the following methods: - Manually sweeping and picking up. - Operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit VDE to 20 percent opacity. - Operating a PM10-efficient street sweeper that has a pickup efficiency of at least 80 percent. - Flushing with water, if curbs or gutters are not present and if using water would not result in a source of trackout material, adverse impacts on stormwater drainage systems, or violate any National Pollutant Discharge Elimination System permit program • Submit a dust control plan to the Air Pollution Control Officer (APCO) before the start of any construction activity that would disturb 5 acres or more of surface area, or that would move, deposit, or relocate more than 2,500 cubic yards per day of bulk				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	materials on at least 3 days. Do not begin construction activities until the APCO has approved or conditionally approved the dust control plan. Notify the APCO in writing, via fax or letter, within 10 days before earthmoving activities commence. The project proponent will implement the following SJVAPCD-recommended enhanced and additional control measures for all construction phases to further reduce fugitive PM_{10} dust emissions: • Install sandbags or other erosion control measures to prevent silt runoff to public roadways from adjacent project areas with a slope greater than 1 percent. • Suspend excavation and grading activity when winds exceed 20 mph. Reduction of Ozone Precursor Emissions During Construction. Compliance with SJVAPCD's Rule 9510 would result in a minimum 20 percent reduction in NOX emissions from heavy-duty diesel equipment, compared with statewide average emissions. Implementing the ISR rule would also reduce emissions of ROG and PM10 exhaust from heavy-duty diesel equipment by 5 percent and 45 percent, respectively. All or part of the reductions may be based on the selection of onsite equipment and fuels. The remainder would result from offsite reductions achieved by paying fees that would be applied to other SJVAPCD programs that reduce the same pollutants, but at other sources. One such program involves replacing the engines in various types of diesel-powered portable industrial equipment with either cleaner diesel engines, or converting such equipment to electric motors. Reduction of Particulate Emissions During Construction. The project proponent will comply with SJVAPCD Regulation VIII, as required by law. This mitigation measure includes additional SJVAPCD-recommended control measures that will further reduce particulate emissions. As a result, generation of construction-related dust (PM10 emissions) will be reduced below SJVAPCD levels of significance.				
7.0 Climate Change					

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
CLM-1 Program	**Implement All Feasible Measures to Reduce Emissions.** The project proponent will provide a complete quantitative project-level analysis of greenhouse gas (GHG) emissions as part of the subsequent environmental review for each individual project. The GHG analysis for each project shall be based on the types, locations, numbers, and operations of equipment to be used; the amount and distance of material to be transported; worker trips required; and electricity generation. The project proponent will be required to implement all feasible measures for reducing GHG emissions such as those listed in the Office of Planning and Research (OPR) *Technical Advisory on CEQA and Climate Change* (2008), and the SJVAPCD Guidance document (SJVAPCD 2009).	During project-level planning, design, and permitting	Project proponent		
8.0 Cultural Resources					
CUL-1 Program	**Comply with Section 106 of the National Historic Preservation Act (NHPA) or Equivalent.** The Federal project proponent, if any, will comply with Section 106 of the NHPA during subsequent site-specific studies, including complying with the Programmatic Agreement (PA) developed as part of Mitigation Measure CUL-2. The State project proponent, if any, must comply with Sections 5024 and 5024.5 of the Public Resources Code (PRC). Sections 5024 and 5024.5 of the PRC require State agencies to confer with the SHPO before implementing any project with the potential to affect historical resources listed in or potentially eligible for inclusion in the National Register of Historic Places (NRHP) or registered as or eligible for registration as a state historical landmark. In addition, the State project proponent may choose to join the PA as a signatory agency. Site-specific environmental reviews will be conducted before all ground-disturbing activities. The following mitigation measures, consisting of inventory, evaluation, and treatment processes, will be conducted by the project proponent as part of the environmental reviews to ensure compliance with Section 106 of the NHPA or Sections 5024 and 5024.5 of the PRC, as applicable. Coordination will continue with the relevant	Pre-construction (prior to ground-disturbing construction activities)	Federal project proponent, if any; State project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	Native American tribes in the area, as necessary to complete these compliance processes. The mitigation measures that will reduce the impacts of the program-level actions are: • **Conduct Class III cultural resources surveys of portions of the project area that have not been surveyed.** Before any ground disturbance takes place in the project area (including areas of ancillary activities, such as staging areas and access routes), Class II cultural resource surveys covering the area of potential effects will be conducted to locate and record cultural resources. Where appropriate, subsurface discovery efforts also will be undertaken to identify buried archaeological sites. • **Plan activities to avoid known cultural resources.** Before carrying out ground-disturbing activities, areas that have been delineated as containing cultural resources will be demarcated, and all ground-disturbing or related activities will be planned to avoid these areas. • **Evaluate significance of resources that cannot be avoided.** If cultural resources cannot be avoided through careful planning of the activities associated with a project, additional research or test excavation (as appropriate) will be undertaken to determine whether the resources meet NRHP and/or California Environmental Quality Act (CEQA) significance criteria. • **Develop treatment process to mitigate effects of project upon significant resources.** Impacts on significant resources that cannot be avoided will be mitigated in a manner that is deemed appropriate for the particular resource. Mitigation for significant resources may include, but are not be limited to, data recovery, public interpretation, performance of a Historic American Building Survey or Historic American Engineering Record, or preservation by other means.				
10.0 Geology and Soils					
GEO-1	**Prepare and Implement a Stormwater Pollution Prevention Plan that**				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
Program	**Minimizes the Potential Contamination of Surface Waters, and Complies with Applicable Federal Regulations Concerning Construction Activities.** Construction activities associated with action alternatives are subject to construction-related stormwater permit requirements of the Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program. Any required permits through the Central Valley Regional Water Quality Control Board (RWQCB) will be obtained by project proponents for site-specific projects before any ground-disturbing construction activity. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared that identifies best management practices (BMPs) to prevent or minimize the introduction of contaminants into surface waters. BMPs for the project could include, but would not be limited to, silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, hydraulic mulch, and a stabilized construction entrance. The SWPPP will include development of site-specific structural and operational BMPs to prevent and control impacts on runoff quality, measures to be implemented before each storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means.	Pre-construction (prior to ground-disturbing construction activities) and during construction	Project proponent		
11.0 Hydrology—Flood Management					
FLD-1 Program	**Implement Design Standards to Minimize Risk of Loss, Injury, or Death Involving Flooding.** Each site-specific study will include an analysis of the potential of that project to locally impede flow or transfer flood risk to downstream areas as a result of changes in velocity, stage, or cross-section. If a site-specific study identifies the potential for a program-level action to locally impede flow or transfer flood risk to downstream areas, the project proponents for the site-specific project will incorporate actions into site-specific design of individual projects to reduce redirected flood flow impacts to less-than-significant levels. Site-specific projects that cannot or do not reduce redirected flood impacts to less than significant levels will not be	During project-level planning, design, and permitting	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	implemented as part of the SJRRP. Because the details of the program-level actions are not known at this time, there is insufficient information available to describe specific actions that would reduce this impact to less than significant levels. However, incorporating actions into project design and mitigation measures to reduce redirected flood flow impacts to less than significant levels will be accomplished using known and accepted engineering design standards and features. Actions could include but would not be limited to modifications to project design, modifications to existing levees, providing a larger floodplain between levees through the acquisition of land and construction of setback levees, or regrading of land between levees.				
12.0 Hydrology—Groundwater					
GRW-1a Program	**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.** Construction activities associated with action alternatives are subject to construction-related stormwater permit requirements of the Federal Clean Water Act's NPDES program. Any required permits through the Central Valley RWQCB will be obtained by project proponents for site-specific projects before any ground-disturbing construction activity. A SWPPP will be prepared that identifies BMPs to prevent or minimize the introduction of contaminants into surface waters. BMPs for the project could include, but would not be limited to, silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, hydraulic mulch, and a stabilized construction entrance. The SWPPP will include development of site-specific structural and operational BMPs to prevent and control impacts on runoff quality, measures to be implemented before each storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means.	Pre-construction (prior to ground-disturbing construction activities) and during construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
GRW-1b Program	**Conduct Phase I Environmental Site Assessments.** Project proponents of subsequent site-specific projects will conduct a Phase I Environmental Site Assessment to determine the presence of any hazardous materials at all construction sites at which ground-disturbing activities would occur. Project proponents of subsequent site-specific projects will implement all the recommended actions and measures identified in the Phase I Environmental Site Assessment.	During project-level planning, design, and permitting	Project proponent		
13.0 Hydrology—Surface Water Supplies and Facilities Operations					
SWS-1 Program	**Provide Alternative Temporary or Permanent River Access to Avoid Diversion Losses.** If the potential for significant impacts to existing operational diversion facilities due to construction activities is identified during site-specific studies, the project proponent would provide alternative equivalent pumping capacity. Permanent diversion facility relocations would be incorporated in the designs of any restoration action that would permanently impact existing facilities.	During project-level planning, design, and permitting of restoration actions with permanent effects on existing facilities	Project proponent		
14.0 Hydrology—Surface Water Quality					
SWQ-1a Program	**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.** Construction activities associated with action alternatives are subject to construction-related stormwater permit requirements of the Federal Clean Water Act's NPDES program. Any required permits through the Central Valley RWQCB will be obtained by project proponents for site-specific projects before any ground-disturbing construction activity. A SWPPP will	Pre-construction (prior to ground-disturbing	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	be prepared that identifies BMPs to prevent or minimize the introduction of contaminants into surface waters. BMPs for the project could include, but would not be limited to, silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, hydraulic mulch, and a stabilized construction entrance. The SWPPP will include development of site-specific structural and operational BMPs to prevent and control impacts on runoff quality, measures to be implemented before each storm event, inspection and maintenance of BMPs, and monitoring of runoff quality by visual and/or analytical means.	construction activities) and during construction			
SWQ-1b Program	**Conduct and Comply with Phase I Environmental Site Assessments in the Restoration Area.** Project proponents of subsequent site-specific projects will conduct a Phase I Environmental Site Assessment to determine the presence of any hazardous materials at all construction sites at which ground-disturbing activities would occur. Project proponents of subsequent site-specific projects will implement all the recommended actions and measures identified in the Phase I Environmental Site Assessment.	During project-level planning, design, and permitting	Project proponent		
16.0 Land Use					
LUP-1a Program	**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.** To support the continued productive use of Important Farmland in the corridor between proposed levees and at borrow sites, the project proponent will implement the following measures where appropriate, and be consistent with the purpose and objectives of the SJRRP (as determined by Reclamation and DWR), in the design and implementation of the levee setback: • When selecting sites for borrow excavation, minimize the fragmentation of lands that are to remain in agricultural use.	During project-level planning, design, and permitting of setback levees	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	Retain contiguous parcels of agricultural land of sufficient size to support their efficient use for continued agricultural production. • Perform reclamation of all borrow sites in compliance with the California State Surface Mining and Reclamation Act (SMARA), thus retaining their potential use for agriculture. Under SMARA, the removal of borrow material is a surface mining activity and as such is regulated by the SMARA statute. SMARA requires that the surface mine operator secure a use permit, reclamation plan, and financial assurance mechanism. The SMARA statute also identifies activities and situations that are exempt from SMARA. The project proponent will comply with SMARA by coordinating with the relevant SMARA lead agency (usually within the county in which mining occurs) and the California Department of Conservation to identify and implement the appropriate mechanism for satisfying SMARA. • Where the levee system and Mendota Pool Bypass would transect agricultural properties, and the landowners desire to continue agricultural use on the portions located within the levee system and bypass, provide a means of convenient access to these properties. • 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) 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				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	agricultural purposes. • 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. Restoration for agricultural use would include redistribution of salvaged topsoil and earthwork for necessary irrigation and drainage. • Redistribute the most productive salvaged topsoil that is not used in restoring agricultural uses to affected Important Farmland. Redistribution will be to less productive agricultural lands near but outside the levee setback and Mendota Pool Bypass areas that could benefit from the introduction of good-quality soil. By agreement between Reclamation or landowners of affected properties and the recipient(s) of the topsoil, the recipient(s) must use the topsoil for agricultural purposes. • Minimize disturbance of Important Farmland and continuing agricultural operations during construction by implementing the following measures: - Locate construction laydown and staging areas on sites that are fallow, disturbed, or to be discontinued for use as agricultural land to the extent possible. - Use existing roads to access construction areas to the extent possible. • Coordinate with growers to develop appropriate construction practices to minimize construction-related impairment of agricultural productivity. Practices may include coordinating the movement of heavy equipment within the levee setback and Mendota Pool Bypass areas and implementing traffic control measures outside these areas.				
LUP-1b	**Minimize Impacts on Williamson Act–Contracted Lands, Comply with Government Code Sections 51290–51293, and Coordinate with**				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
Program	**Landowners and Agricultural Operators.** To reduce impacts on lands under Williamson Act and Super Williamson Act contracts, the project proponent will implement the measures described below. • The project proponent will comply with California Government Code Sections 51290–51295 with regard to acquiring lands under Williamson Act–contracted lands. Sections 51290(a)–51290(b) state that State policy, consistent with the purpose of the Williamson Act to preserve and protect agricultural land, is to avoid locating public improvements and any public utilities improvements in agricultural preserves, whenever practicable. If such improvements must be located within a preserve, they will be located on land that is not under contract. • More specifically, the project proponent will comply with the following basic requirements stated in the California Government Code: - Whenever it appears that land within a preserve or under contract may be required for a public improvement, California Department of Conservation and the city or county responsible for administering the preserve must be notified (Section 51291(b)). - Within 30 days of being notified, California Department of Conservation and the city or county would forward comments, which would be considered by the proponent of the public improvement (Section 51291(b)). - A public improvement may not be located within an agricultural preserve unless findings are made that (1) the location is not based primarily on the lower cost of acquiring land in an agricultural preserve and (2) for agricultural land covered under a contract for any public improvement, no other land exists within or outside the preserve where it is reasonably feasible to locate the public improvement	During project-level planning, design, and permitting and before acquisition of Williamson Act–contracted lands	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	(Sections 51921(a) and 51921(b)). - The contract would be terminated when land is acquired by eminent domain or in lieu of eminent domain (Section 51295). - California Department of Conservation would be notified within 10 working days upon completion of the acquisition (Section 51291(c)). - California Department of Conservation and the city or county would be notified before completion of any proposed substantial changes to the public improvement (Section 51291(d)). - If, after acquisition, the acquiring public agency determines that the property would not be used for the proposed public improvement, California Department of Conservation and the city or county administering the involved preserve will be notified before the land is returned to private ownership. The land would be reenrolled in a new contract or encumbered by an enforceable restriction at least as restrictive as that provided by the Williamson Act (Section 51295). • The project proponent will coordinate with landowners and agricultural operators to sustain existing agricultural operations, at the landowners' discretion, within the study area until the individual agricultural parcels are needed for project construction.				
17.0 Noise					
NOI-1 Program	**Implement Measures to Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors.**				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	Project proponents of subsequent site-specific projects will ensure that the following noise-reduction protocol measures are implemented during construction for actions implemented under the action alternatives to reduce temporary and short-term construction-related noise impacts near sensitive receptors: • Conduct a preliminary noise analysis report to determine future program construction noise levels at sensitive receptors based on, but not limited to, a detailed construction equipment list, construction schedule, ground attenuation factors, and distances to sensitive receptors located within 500 feet of future program construction sites. • Provided that future program construction noise results in significant impacts at sensitive receptors, the following mitigation measures shall be implemented: - Equipment will be used as far away as practical from noise-sensitive uses. - Construction equipment will be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded. - Equipment that is quieter than standard equipment will be used, including electrically powered equipment instead of internal combustion equipment where use of such equipment is a readily available substitute that accomplishes program tasks in the same manner as internal combustion equipment. - Construction site and haul road speed limits will be established and enforced. - The use of bells, whistles, alarms, and horns will be	During project-level planning, design, and permitting; pre-construction (prior to ground-disturbing construction activities); and during construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	restricted to safety and warning purposes only. - Construction equipment will not idle for extended periods of time when not being used during construction activities. - When construction activities are conducted within 2,000 feet of noise-sensitive uses, noise measurements will be taken at the nearest noise-sensitive land uses relative to construction activities with a sound-level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2). This would allow that construction noise levels associated with the restoration program to comply with applicable daytime and nighttime noise standards. When construction noise exceeds applicable daytime and nighttime standards, berms, or stockpiles will be used in an attempt to lower noise levels to within acceptable nontransportation standards. If noise levels are still determined to exceed noise standards, temporary barriers will be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers would be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater, as defined by Test Method E90 of the American Society for Testing and Materials. Placement, orientation, size, and density of acoustical barriers will be specified by a qualified acoustical consultant. - A disturbance coordinator will be designated to post contact information in a conspicuous location near the construction site entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise-sensitive receptors, advising them of the construction schedule.				
NOI-2 Program	**Implement Measures to Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors.** If impacts under subsequent site-specific projects are found to have the potential to cause significant or potentially significant impacts during site-specific studies, proponents of those projects will ensure that the following noise-reduction protocol measures are implemented during construction for actions implemented under the action alternatives that would affect the roadway network/system to reduce temporary and short-term construction-related noise impacts near sensitive receptors: • Conduct a preliminary noise analysis report to determine future program haul routes for construction-related traffic noise associated with Settlement actions, and conduct a traffic noise analysis for individual actions to establish existing average daily traffic volumes, fleet mixes (percentages of automobiles, medium-duty trucks, and heavy-duty trucks during daytime, evening, and nighttime hours), and vehicle speeds along designated haul-route roadways. • Provided that future program construction haul route noise results in significant impacts at sensitive receptors, the following mitigation measures shall be implemented: - Conduct a noise survey to determine ground attenuation factors, roadway grades, and distances to sensitive receptors along designated haul-route roadways. - Model existing traffic noise levels for comparison of construction-related traffic noise level increases along haul-route roadway segments using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) or other	During project-level planning, design, and permitting; pre-construction (prior to ground-disturbing construction activities); and during construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	acceptable traffic noise prediction models (e.g., TNM, Soundplan). - Identify roadway segments along haul routes that result in a substantial increase of construction-related traffic noise levels caused by SJRRP actions. - Develop and implement project-specific mitigation measures to reduce construction-related traffic noise-level increases on haul routes near sensitive resources to include, but not be limited to the following: ▪ reduce haul truck operation speeds ▪ limit the amount of borrow site material to be hauled daily ▪ limit the hours of operation for haul trucks ▪ install temporary noise barriers adjacent to sensitive receptor locations - Equip all heavy trucks with noise-control devices (e.g., mufflers) in accordance with manufacturers' specifications. - Inspect all heavy trucks periodically to ensure proper maintenance and presence of noise-control devices (e.g., lubrication, non-leaking mufflers, and shrouding).				
NOI-3 Program	**Implement Measures to Reduce Long-Term Operation-Related Noise Levels from Stationary Sources on Sensitive Receptors.** Project proponents of subsequent site-specific projects will conduct a preliminary noise analysis report to determine future operation-related noise and distances to sensitive receptors. Provided that future operation-related noise results in significant impacts at sensitive receptors, project proponents of subsequent site-specific projects will incorporate into the construction design measures such as a structure encasing the new pumping infrastructure. Materials (masonry brick, metal shed, wood) used to house the pumping infrastructure will be of solid	During project-level planning, design, and permitting	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	construction and void of gaps at the ground, roof line, and joints. All vents will include acoustically rated louvers.				
NOI-4 Program	**Implement Measures to Reduce Borrow Site Noise Levels Near Sensitive Receptors.** Project proponents of subsequent site-specific projects will ensure that measures such as the following noise-reduction protocol measures are implemented for actions implemented under the action alternatives that requires the use of borrow sites near sensitive receptors: • Conduct a preliminary noise analysis report to determine future construction-related program borrow site noise based on, but not limited to, a detailed equipment list, hours of operation, ground attenuation factors, and distances to sensitive receptors located within 500 feet of future program borrow sites. • Provided that future program borrow site noise results in significant impacts at sensitive receptors, the following mitigation measures shall be implemented: - Evaluate resultant borrow site activity noise levels at sensitive receptor locations, taking into account distance, site topography, and ground type. - Identify sensitive receptors that would experience borrow site noise levels that exceed applicable noise standards. - Incorporate the use of stockpiles, dumpsters, trailers, or inactive heavy-duty equipment to perform as temporary barriers. If noise levels are still determined to exceed noise standards, temporary barriers will be erected as close to the construction activities as feasible, breaking the line of sight between the source and the receptor where noise levels exceed applicable standards. All acoustical barriers will be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission	During project-level planning, design, and permitting; and during construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	Class rating of 25 or greater, as defined by Test Method E90 of the American Society for Testing and Materials. Placement, orientation, size, and density of acoustical barriers will be specified by a qualified acoustical consultant. - Limit borrow site activities to daytime hours only when in close proximity to sensitive receptors, to avoid the more sensitized state of receptors typical of evening and nighttime hours.				
NOI-5 Program	**Implement Measures to Reduce Temporary and Short-term Groundborne Noise and Vibration Levels Near Sensitive Receptors.** Project proponents of subsequent site-specific projects will ensure that the following protocol measures are implemented during construction for actions implemented under the action alternatives to reduce temporary and short-term groundborne noise and vibration levels on sensitive receptors: • Conduct a preliminary groundbourne noise and vibration analysis report to determine future construction-related program groundbourne noise and vibration levels based on, but not limited to, a detailed equipment list, hours of operation and distances to sensitive receptors located within 500 feet of future program borrow sites. • Provided that future program groundbourne noise and vibration results in significant impacts at sensitive receptors, the following mitigation measures shall be implemented: - A disturbance coordinator will be designated and this person's contact information will be posted in a location near construction areas where it is clearly visible to the nearby receptors most likely to be disturbed. The coordinator would manage complaints and concerns resulting from activities that cause vibrations. The severity of the vibration concern should be assessed by the	During project-level planning, design, and permitting; pre-construction (prior to ground-disturbing construction activities); and during construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	coordinator and, if necessary, evaluated by a qualified noise and vibration control expert. - Vibration monitoring will be conducted before and during pile driving operations occurring within 100 feet of historic structures. Every attempt will be made to limit construction-generated vibration levels during pile driving and other groundborne noise and vibration-generating activities in the vicinity of the historic structures in accordance with Caltrans recommendations. - Adjacent historic features will be covered or temporarily shored, as necessary, for protection from vibrations, in consultation with the appropriate cultural resources authority. - Pile driving required within a 50-foot radius of residences will use alternative installation methods where possible (e.g., pile cushioning, jetting, predrilling, cast-in-place systems, resonance-free vibratory pile drivers). This would reduce the number and amplitude of blows required to seat the pile. - Pile-driving activities conducted within 285 feet of sensitive receptors will occur during daytime hours to avoid sleep disturbance during evening and nighttime hours.				
18.0 Paleontological Resources					
PAL-1 Program	**Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.** To minimize potential adverse impacts on unique, scientifically important paleontological resources during earthmoving activities, Mitigation Measure PAL-1 would be implemented by the project proponent during construction for any action implemented under the Settlement to reduce	During construction	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
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Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	possible damage to unique paleontological resources, as described below. If paleontological resources are discovered during earthmoving activities, the construction crew would immediately cease work in the vicinity of the find. A qualified paleontologist would be retained to evaluate the resource and prepare a recovery plan in accordance with Society of Vertebrate Paleontology guidelines (SVP 1995). The recovery plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan would be implemented before construction activities could resume at the site where the paleontological resources were discovered.				
20.0 Public Health and Hazardous Materials					
PHH-1 Program	**Conduct Phase I Environmental Site Assessments.** Project proponents of subsequent site-specific projects will conduct a Phase I Environmental Site Assessment to determine the presence of any hazardous materials at all construction sites at which ground-disturbing activities would occur. Project proponents of subsequent site-specific projects will implement all the recommended actions and measures identified in the Phase I Environmental Site Assessment.	During project-level planning, design, and permitting	Project proponent		
PHH-4 Program	**Implement Workplace Precautions against West Nile Virus and Valley Fever.** Project proponents of subsequent site-specific projects will implement the following workplace precautions against West Nile virus and Valley Fever at construction sites: • Inspect work areas, eliminate sources of standing water that could potentially provide breeding habitat for mosquitoes. For example, eliminate uncovered, upright containers that could	Pre-construction (prior to ground-disturbing construction	Project proponent		

Table B2.
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Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	accumulate water; store open containers in the work area; and fill or drain potholes and other areas where water is likely to accumulate. • Conduct employee training that covers the potential hazards and risks of West Nile virus and Valley Fever exposure and protection, including proper construction apparel. Employees will be instructed not to touch any dead birds with their bare hands. • Provide dust masks for worker use at construction sites during ground-disturbing activities. • Provide insect repellent for worker use at construction sites with a minimum of 23.8 percent diethyl(meta)toulamide (DEET). • Notify the appropriate city or county health department of dead birds seen on the construction site.	activities) and during construction			
PHH-5 Program	**Minimize Hazards to School Safety.** Project proponents of subsequent site-specific projects will notify all schools, or the related school district, located within one-quarter mile of a construction area regarding the construction activities that would occur and when, the type of potential hazards that could be encountered, and provide guidance to the school(s) on the potential effects that the hazards could have on school children.	Pre-construction (prior to ground-disturbing construction activities)	Project proponent		
PHH-6 Program	**Minimize Hazards from Idle and Abandoned Wells.** Project proponents of subsequent site-specific projects will survey all project sites for unknown idle and abandoned wells before initiating ground-disturbing activities. If the survey discovers an idle or abandoned well, ground-disturbing activities will not occur within 100 feet of the well, if feasible. If ground-disturbing activities need to occur within 100 feet of the abandoned well, project proponents of subsequent site-specific projects will either cover, fence, or otherwise clearly mark the well	Pre-construction (prior to ground-disturbing construction	Project proponent		

Table B2.
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	location and take measures to reduce hazards to workers and/or ensure that the well has been abandoned in accordance with State and local regulations, whichever is appropriate for the site and construction project. Fresno County Department of Public Health, Environmental Health Division, Merced County Department of Environmental Health, or Madera County Department of Environmental Health will be notified, as appropriate.	activities)			
21.0 Recreation					
REC-4 Program	**Enhance Fishing Access and Fish Populations on the Kings River Below Pine Flat Dam.** The project proponent would mitigate trout fishing opportunities lost on the San Joaquin River below Friant Dam because of Settlement actions by enhancing public fishing access and trout populations on the Kings River below Pine Flat Dam. Specific actions to enhance fishing access would be developed in cooperation with the Kings River Conservancy and State and local agencies participating in ongoing park and river access construction and enhancement projects. Example projects include construction of the Kings River Access Park or similar facilities to provide anglers and others with amenities such as nonmotorized boat launches, parking areas, restrooms, information kiosks, and picnic tables. In addition, specific actions to enhance trout populations could be developed in cooperation with the Kings River Water Association, Kings River Conservation District, and Department of Fish and Game (DFG) in support of the Kings River Fisheries Management Program Framework Agreement and Fisheries Management Program. Specific actions to enhance trout populations may include fish habitat enhancement projects in the river, fish stocking, and fish population monitoring. Actions could also include hatchery production of catchable trout, particularly if the San Joaquin Hatchery reduces trout production as a result of producing salmon in support of implementing the Settlement.	During implementation of Settlement actions	Project proponent		
REC-5 Program	**Enhance Warm-Water Fishing Access and Fish Populations in the Vicinity of the San Joaquin River Below Friant Dam.**				

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Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	The project proponent would mitigate warm-water fishing opportunities that may be lost as a result of filling or isolating gravel pit ponds in the floodplain of Reach 1 of the San Joaquin River by enhancing remaining warm-water fishing opportunities or creating new opportunities in the vicinity. Specific actions to enhance warm-water fishing opportunities would be developed in cooperation with the San Joaquin River Conservancy, the San Joaquin River Parkway and Conservation Trust, DFG, Fresno County, and other agencies participating in management of the San Joaquin River Parkway. Enhancement actions could include improvements to facilities such as Sycamore Island Park (owned by the San Joaquin River Conservancy and operated by a concessionaire) and Woodward Park (owned and operated by the City of Fresno) where warm-water fishing opportunities exist and will remain. Creation of new opportunities could occur through development of new ponds in the vicinity of the parkway but in locations that would not create potential conflicts with Settlement goals. A potential location for development of a new pond is Fresno County's Lost Lake Park, close to Friant Dam, where a recent Master Plan update has proposed creation of a new pond. The number and extent of mitigation actions necessary would depend on the amount of publicly accessible warm-water fishing access lost as a result of Settlement actions.	During implementation of Settlement actions	Project proponent		
23.0 Transportation and Infrastructure					
TRN-1 Program	**Minimize Short-term Impacts on Traffic Circulation and Roadway Capacity.** To minimize impacts on traffic circulation and roadway capacity, including emergency vehicle access, the project proponent will implement the following measures: • Require construction contractors to limit truck trips to less than 50 per hour on any affected roadway during the morning and afternoon or evening peak hour periods, if feasible. • Before construction, prepare a traffic management plan that identifies the number of truck trips, time of day for arrival and	Pre-construction (prior to ground-disturbing construction activities) and during	Project proponent		

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				Action	Date Completed
	departure of trucks, limits on number of truck trips, and traffic circulation control measures. Control measures typically include advertising planned lane closures, warning signage, a flag person to direct traffic flows when needed, and methods for maintaining continued access by emergency vehicles. During project construction, access to existing land uses will be maintained at all times, with detours used as necessary during road closures. • Submit the traffic management plan to the appropriate county public works, fire, police, and sheriff departments for comments. • Implement the traffic management plan and feasible recommendations by the appropriate departments.	construction			
TRN-2 Program	**Avoid Disruption of Subsurface Utility Facilities.** To avoid disruption of subsurface utilities from those activities that involve ground disturbance, the project proponent will implement the following measures before construction to the extent feasible: • Request an underground service alert to determine the location of all underground utility facilities. • When underground utility facilities are present, coordinate with the owner of a transmission line or pipeline to obtain design specifications of underground facilities. • Design restoration actions to avoid affecting underground utility facilities. • If avoiding underground facilities is not feasible, coordinate with the utility owner to shut off and relocate the utilities as necessary.	Pre-construction (prior to ground-disturbing construction activities)	Project proponent		
TRN-4 Program	**Minimize Impacts on Public Bicycle and Pedestrian Circulation Facilities.** The project proponent will minimize impacts to public bicycle and	During project-	Project proponent		

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				Action	Date Completed
	pedestrian circulation by avoiding impacts, minimizing closure of paths, and providing for temporary or permanent relocation of the facility to the extent feasible. The appropriate public works department will be consulted to determine the most feasible alignment for facility relocation.	level planning, design, and permitting; and during construction			
24.0 Utilities and Service Systems					
UTL-2 Program	**Obtain Required Permits for Hatchery Wastewater Discharges and Implement Best Management Practices to Reduce Pollutant Discharges.** Before approval and final design and construction of any new hatchery, the project proponents that develop the new or retrofitted hatchery will obtain all required permits for any hatchery discharges from the appropriate agencies, and will comply with those permits.	During project-level planning, design, and permitting of any new fish hatchery	Project proponent of a site-specific project involving development of a new or retrofitted fish hatchery		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
UTL-4 Program	**Identify Landfills with Adequate Permitted Capacity to Accept Solid Waste Generated by Settlement Activities and Dispose of Waste in Accordance with Applicable Regulations.** To ensure that the permitted capacity of landfills would not be exceeded as a result of disposal of solid waste generated by proposed restoration actions, project proponents of subsequent site-specific projects will implement the following measures before implementing one or more restoration actions: • Prepare an estimate of solid waste that will be generated by the action(s). • Maximize the recycling and/or composting of solid waste generated by the action at appropriate locations. • Identify appropriate recycling and/or disposal locations in accordance with applicable Federal, State, and local regulations pertaining to solid waste. • Notify the operator of the recycling/disposal location and obtain approval for the type and amount of solid waste that will be generated by the action(s). If sufficient capacity is unavailable at the identified location, identify and obtain approval for disposal at another location or multiple locations.	During project-level planning, design, and permitting Before construction of subsequent site-specific projects	Project proponent		
25.0 Visual Resources					
VIS-2 Program	**Screen New Facilities and Minimize Adverse Visual Impacts.** Project proponents of subsequent site-specific projects will site new facilities as far from any sensitive view sheds. In addition, project proponents of subsequent site-specific projects will provide visual screening to soften views of the facilities. Landscaping could include establishing vegetated berms and/or planting trees, shrubs, ground cover, and floodplain habitat restoration. Effective visual screening with landscaping also could include vegetation that would grow to cover perimeter fences. In addition, new facilities will be sited to minimize land	During project-level planning, design, and permitting; during construction; and post-	Project proponent		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Program-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	alterations and cut and fill. Any areas disturbed during construction will be replanted with native vegetation. In addition, natural colors and materials and low reflective materials will be used on all new facilities (e.g., bridges) to the extent feasible that they would appear consistent with the existing character of the area.	construction			
VIS-3 Program	**Establish and Require Conformance to Lighting Standards, and Prepare and Implement a Lighting Plan.** To reduce impacts associated with light and glare, for all project phases, project proponents of subsequent site-specific projects will conform to the following guidelines: • If construction lighting is needed, contractors will be required to shield lighting and direct lights downward onto the work site. • Meet the minimum county lighting standards for all project-related lighting. All lighting fixtures will be designed to be consistent with the guidelines contained in the applicable county general plan. • Shield or screen lighting fixtures to direct the light downward and prevent light spill on adjacent properties. • Prohibit the use of harsh mercury vapor, low-pressure sodium, or fluorescent bulbs. • Consider design features, namely directional shielding for all substantial light sources, that will reduce effects of nighttime lighting. In addition, consider the use of automatic shutoffs or motion sensors for lighting features to further reduce excess nighttime light. All nighttime lighting will be shielded to prevent the light from shining off the surface intended to be illuminated.	During project-level planning, design, and permitting; during construction; post-construction; and during operations and maintenance	Project proponent		

Note:
Mitigation Measure REC-3 from the PEIS/R is not applicable to Alternative C1 and, therefore, is not included in this Mitigation Commitments Plan.

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
7.0 Climate Change					
CLM-1 Project	**Implement All Feasible Measures to Reduce Emissions.** The project proponent will provide a complete quantitative project-level analysis of GHG emissions as part of the subsequent environmental review for each individual project. The GHG analysis for each project shall be based on the types, locations, numbers, and operations of equipment to be used; the amount and distance of material to be transported; worker trips required; and electricity generation. The project proponent will be required to implement all feasible measures for reducing GHG emissions such as those listed in OPR *Technical Advisory on CEQA and Climate Change* (2008), and the SJVAPCD Guidance document (SJVAPCD 2009).	During project-level planning, design, and permitting	Reclamation		
8.0 Cultural Resources					
CUL-2 Project	**Comply with Section 106 of the NHPA and Develop and Implement a Programmatic Agreement.** Reclamation will comply with the Federal NHPA Section 106 process to mitigate any significant, adverse impacts to cultural resources and historic properties to less than significant levels. Reclamation will develop a PA with the State Historic Preservation Officer through the Section 106 consultation process. Reclamation will identify archaeological sites and historic Native American places with the potential for significant impacts to occur due to changes in reservoir operations. In the event that release of Interim or Restoration flows are likely to cause damage to a historic property, Reclamation will comply with the process identified in the PA for the evaluation and recovery of data at any such cultural resource. Undocumented cultural resources may also exist in the reservoir basin. If such a site is identified during implementation of the alternatives and release of Interim or Restoration flows is likely to cause damage to such a site, Reclamation will ensure the evaluation and recovery of data at these sites.	Pre-construction (prior to ground-disturbing construction activities)	Reclamation		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
16.0 Land Use					
LUP-4 Project	**Implement Vehicular Traffic Detour Planning.** Mitigation measure LUP-4 is the same as TRN-7, below.	Within 1 year of the signing of the Record of Decision; during project-level planning, design, and permitting; and during construction	Reclamation		
LUP-5 Project	**Preserve Agricultural Productivity of Important Farmland to Minimize Effects of Inundation and Saturation Effects.** If seepage effects cannot be avoided or are addressed by compensating affected landowners resulting in conversion of agricultural land to nonagricultural use or a reduction in productivity of agricultural land, Reclamation will implement the following measures to minimize effects of inundation and saturation of agricultural land by Interim and Restoration flows: • 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.	Before and during release of Interim and Restoration flows	Reclamation		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	Reclamation will, as necessary, either (1) acquire agricultural conservation easements at a 1:1 ratio (i.e., acquire easements on 1 acre for each 1 acre of Important Farmland removed from agricultural use) to be held by land trusts or public agencies who are 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.[1]				
20.0 Public Health and Hazardous Materials					
PHH-9 Project	**Coordinate with and Support Vector Control District(s).** Reclamation will coordinate with and support Fresno County Department of Public Health (FCDPH)-Vector Control, Merced County Mosquito Abatement District, and the Madera County Mosquito and Vector Control District with implementation of their vector control activities in response to project-level actions as appropriate and feasible. Support will include but not be limited to the following actions: • Coordinate with FCDPH-Vector Control, Merced County Mosquito Abatement District, and the Madera County Mosquito and Vector Control District to inform vector control districts regarding project implementation, and to provide information requested to support vector control activities along waterways affected by project-level actions. Provide FCDPH-Vector Control, Merced County Mosquito Abatement District, and Madera County Mosquito and Vector Control District alternative access as needed for vector monitoring and control in the Restoration Area where the program would eliminate existing access. • Implement applicable best management practices from the California Department of Public Health's *Best Management Practices for Mosquito Control on California State Properties*	Before and during release of Interim and Restoration flows; during pre-construction (prior to ground-disturbing construction activities); and during construction	Reclamation		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	(CDPH 2008). Provide public information for the community regarding control measures being implemented in the Restoration Area, the risk of mosquito-borne disease transmission, and personal protective measures.				
21.0 Recreation					
REC-9 Project	**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.** Reclamation will monitor Millerton Lake pool elevations and, if pool elevations fall below the toe elevations of the two lowest-reaching boat ramps (which are at McKenzie Cove and Meadows), Reclamation will mitigate by either extending existing low-water launch ramp(s), developing a new ramp, or providing other temporary access to avoid loss of launching capacity and to permit boats to be launched on the lake with an additional 10 to 15 feet of drawdown during mid- and late-summer of Dry and Critical-High water years. Specific actions to modify or relocate facilities in the Millerton Lake State Recreation Area will be developed within two years. Implementation would be financed by Reclamation in coordination with California Department of Parks and Recreation.	During implementation of Interim and Restoration flow releases	Reclamation		
REC-12 Project	**Develop and Implement Recreation Outreach Program.** Reclamation will develop and implement a recreation outreach program, and will prepare and implement a recreation outreach plan. The plan will be completed within 1 year of the signing of the Record of Decision. Until such time as the plan is in place, Reclamation will continue to implement the recreation outreach plan developed for the most recent Interim Flows Project. The purpose of the recreation outreach program will be to inform the	Within 1 year of the signing of the Record of Decision with implementation during Interim and Restoration	Reclamation		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	recreating public as well as agencies and organizations that serve the recreating public and protect public safety, of changes in river flows that would occur as a result of the Restoration Flows, and of the potential effects associated with those changes, including recreational boating hazards, particularly in Reach 1. The program will also inform the public of similar alternative boating opportunities in the area, such as those available on the lower Kings River below Pine Flat Reservoir. The outreach program will make use of a variety of methods and media to share information with the recreating public. Communication methods and actions may include: • Messages posted on the SJRRP Web site and Web sites of agencies and organizations providing recreation access, facilities, and services and public safety services in each reach • Signage at public and private access points and facilities in each reach • Verbal messages delivered as part of regular recreation programs offered by agencies and organizations, such as the Public Canoe Program conducted by the San Joaquin River Parkway and Conservation Trust • Signage to advise boaters of hazardous conditions and alternative locations for boating will comply with waterway marker requirements contained in CCR Title 14, Sections 7000 through 7007, under the authority of California Department of Boating and Waterways • Attendance of a SJRRP representative at selected public events focused on San Joaquin River recreation, or the display and distribution of printed material at such events Outreach will target both English-speaking and non-English-speaking residents. Additional measures, such as roving contacts and other methods that agencies may suggest, will be used to ensure target audiences that may not be reached by other means, such as young adults and those recreating on the river in undeveloped areas, will be	flow releases			

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	reached. Central to the outreach program would be coordination with agencies and organizations that provide recreation access, facilities, and services in each reach. Specifically, this would include the following public and nonprofit agencies and organizations: the San Joaquin River Parkway and Conservation Trust, San Joaquin River Conservancy, Fresno County, City of Fresno Parks, After School, Recreation, and Community Service Department, and DFG. Because boaters, swimmers, and waders may encounter less safe boating, swimming, and wading conditions due to Interim and Restoration flows, and may need assistance or may generate public nuisances (such as open fires) in areas that had not been commonly used or in previously dry river areas that may be less familiar to response agencies, key partners to help protect public safety will also include all emergency rescue, response, and enforcement agencies in all reaches expected to experience expanded recreation activity.				
23.0 Transportation and Infrastructure					
TRN-7 Project	**Implement Vehicular Traffic Detour Planning.** Reclamation will prepare a long-term vehicular detour plan for routes that may be inundated as a result of the release of Interim and Restoration flows. Reclamation will complete the vehicular detour plan in accordance with current Caltrans Standard Plans and Specifications within 1 year of the signing of the Record of Decision. The vehicular detour plan will provide convenient and parallel vehicular traffic detours for routes closed because of inundation by Interim and Restoration flows. Until the long-term vehicular detour plan is completed, Reclamation will continue to implement the vehicular detour plan currently in place for the release of Interim Flows. The detour plan will include an assessment of existing roadway conditions, whether paved or unpaved, and provisions for repair and maintenance if the roadway conditions are substantially degraded from	Within 1 year of the signing of the Record of Decision; during project-level planning, design, and permitting; and during construction	Reclamation		

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	increased use. After the detour route is identified and before flows are released that would overtop existing crossings, the condition of the detour road surface will be assessed and documented in a technical memorandum. The technical memorandum will be submitted to the local agency responsible for maintenance of the road, e.g., county public works department if it is a county road or land owner if the proposed detour is a private road. After the detour is no longer needed, the condition of the road surface will be assessed and documented in a technical memorandum. The technical memorandum will identify substantial changes in the condition of the road surface, such as potholing or rutting. Repair and maintenance actions needed to restore the road surface to pre-detour conditions will be identified in the technical memorandum. The technical memorandum will be submitted to the local maintenance agency. In coordination with the local maintenance agency, the repair and maintenance actions may be conducted by Reclamation or by the local maintenance agency to be proportionately reimbursed by Reclamation. The detour plan will prioritize paved roads for use as detour routes. If paved roadway detours are not feasible during Interim or Restoration flow road inundation periods, the detour plan will require that VDE from unpaved detour routes will be limited to 20 percent opacity by implementing at least one of the following control measures identified in SJVAPCD regulations regarding stabilizing unpaved roadways: • Watering • Uniform layer of washed gravel • Chemical/organic dust stabilizers/suppressants in accordance with the manufacturer's specifications • Roadmix • Paving Any other method that can be demonstrated to the satisfaction of the Air Pollution Control Officer that effectively limits VDE to 20 percent opacity				

Table B2.
Mitigation Commitment Plan and Tracking Program for the San Joaquin River Restoration Program
(For Project-Level Actions)

Mitigation Number	Mitigation Measure	Timing/ Schedule	Implementation Responsibility	Completion of Implementation	
				Action	Date Completed
	and meets the conditions of a stabilized unpaved road.				

Notes:
(1) To provide additional clarification, releases of SJRRP Interim and Restoration flows would be limited to then-existing channel capacities as explained in Table B1, commitments EC-1, EC-2, and EC-3. Additionally, the Physical Monitoring and Management Plan (as identified in EC-7) identifies long-term actions that would provide for additional seepage management, including "purchasing easements and/or compensation for seepage effects, construction of slurry walls to reduce seepage flows, construction of seepage berms to protect against levee failure, construction of drainage interceptor ditches to protect affected lands, or installation of tile drains on affected lands. If property or crop losses occur attributable to Interim and Restoration flow seepage, Reclamation would work in good faith with landowners to negotiate fair and reasonable easements and/or compensation for seepage effects." SJRRP flow increases beyond then-existing channel capacities or those which could result in detrimental seepage impacts or reduction in the levee slope stability or underseepage Factors of Safety would not occur until such time as reasonable accommodations are made with affected landowners and with relevant legal permissions.

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