



Third Party Working Draft FRAMEWORK FOR IMPLEMENTATION



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Framework for Implementation
San Joaquin River Restoration Program

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1.0 Introduction and Background

This Framework for Implementation describes how the U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (Service), National Marine Fishery Service (NMFS), California Department of Water Resources (DWR), and California Department of Fish and Game (DFG); (collectively, Implementing Agencies or Agencies) may implement the Stipulation of Settlement in the *Natural Resources Defense Council, et al., v. Kirk Rodgers, et al.* (Settlement) and San Joaquin River Restoration Settlement Act (Title X of Public Law 111-11) based on the current status of projects and knowledge gained since the signing of the Settlement in 2006.

The Implementing Agencies intend this to be a “living” document, subject to revision as more information is gained and milestones reached. This Framework represents a path forward in compliance with the Settlement and the Act but may not encompass all actions that may ultimately be taken to implement the San Joaquin River Restoration Program (SJRRP). The ultimate implementation of the SJRRP will depend on decisions made through the National Environmental Policy Act (NEPA) and/or California Environmental Quality Act (CEQA) process, issuance of permits, the Fisheries Management Plan, the Reintroduction Strategy and other steps which will help inform implementation.

1.1 Background

In 1988, a coalition of environmental groups led by the Natural Resources Defense Council (NRDC) filed a lawsuit challenging the renewal of the long-term water service contracts between the United States and the Central Valley Project Friant Division Contractors. After more than 18 years of litigation, the NRDC, Friant Water Authority (FWA), and the Departments of the Interior and Commerce (collectively, Settling Parties) reached agreement on the terms and conditions of the Settlement. The court approved the Settlement on October 23, 2006. The San Joaquin River Restoration Settlement Act (Settlement Act) was signed by the U.S. President and became law on March 30, 2009.

The Settlement includes two parallel goals:

- Restoration - To restore and maintain fish populations in “good condition” in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish; and
- Water Management - To reduce or avoid adverse water supply impacts to all of the Friant Division long-term Contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for the release of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. To achieve the Water Management Goal, the Settlement calls

1 for the Secretary of the Interior, in consultation with the Plaintiffs and Friant Parties, to develop
2 and implement a plan for recirculation, recapture, reuse, exchange, or transfer of the Interim and
3 Restoration flows and a Recovered Water Account and program for the purpose of reducing or
4 avoiding impacts to water deliveries to all of the Friant Division long-term contractors caused by
5 the Interim and Restoration flows on the Friant Division long-term contractors. In addition to the
6 Settlement, Part III of the Settlement Act authorizes and directs the Secretary of the Interior
7 (Secretary) to conduct additional Water Management Goal actions to further reduce or avoid
8 impacts to water deliveries caused by the Interim and Restoration flows. The Settlement and
9 Settlement Act are, collectively, being implemented as one program, the San Joaquin River
10 Restoration Program (SJRRP). Figure 1 shows a map of the San Joaquin River from Friant Dam
11 to the Merced River confluence, which is the Restoration Area.

12 **1.1.1 Current Status and Purpose of this Document**

13 The Settlement includes milestone dates for completion of certain activities. These milestones
14 dates include the following:

- 15 • Initiation of Interim Flows in 2009;
- 16 • Completion of a permit application for the collection of spring-run Chinook salmon in
17 2010;
- 18 • Reintroduction of spring-run and fall-run Chinook salmon in 2012;
- 19 • Completion of the Paragraph 11(a) highest priority channel and structural improvement
20 projects in 2013; and
- 21 • Initiation of Restoration Flows in 2014.

22 The Agencies initiated Interim Flows and completed the permit application for the collection of
23 spring-run Chinook salmon on schedule. Some actions, such the completion of Paragraph 11(a),
24 highest priority channel and structural improvement projects are unavoidably behind schedule.
25 Additionally, the Agencies have collected substantially more data and information since the
26 Settlement was signed, and have a fuller understanding of necessary steps to meet the Settlement
27 and Settlement Act

28 This *Framework for Implementation* makes use of new information to provide a revised schedule
29 and budget to guide SJRRP activities, and a revised approach to implementing the Settlement
30 and Settlement Act. The objectives are as follows:

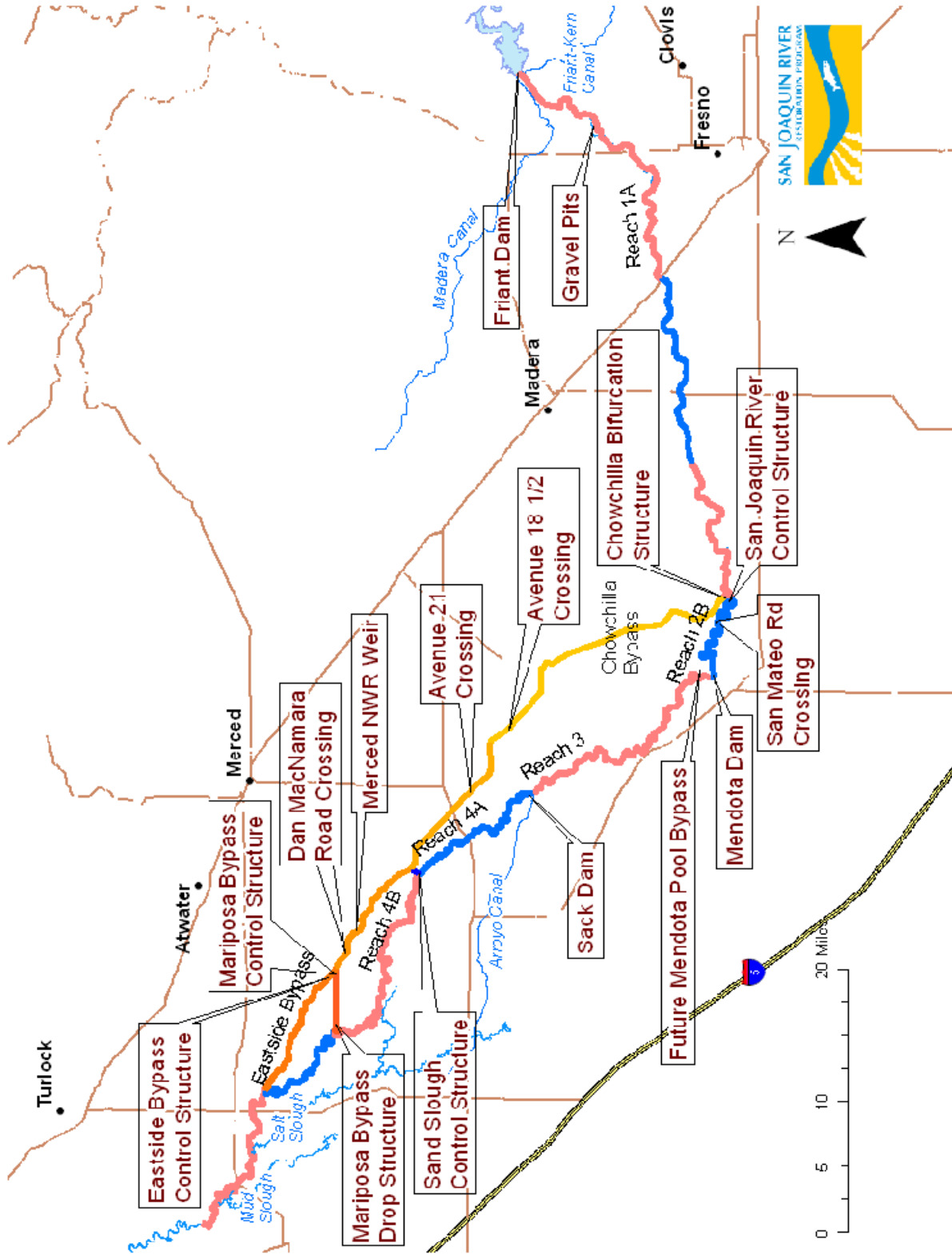
- 31 1. Identify the conditions necessary to reintroduce Chinook salmon to the San Joaquin River
32 in light of existing and anticipated river conditions, and in a manner consistent with the
33 Settlement and Settlement Act.
- 34 2. Identify the Agencies' priorities in achieving the Restoration and Water Management
35 Goals.
- 36 3. Identify the actions that require additional information, and establish the relative benefits
37 and costs before committing resources to those actions.
- 38 4. Identify actions that can be undertaken incrementally, while preserving the flexibility to
39 adjust and adapt as the Agencies learn more about actions that may benefit the
40 Restoration and Water Management Goals.

1 The Agencies have made a long-term commitment to restore the San Joaquin River and provide
2 water supply to the Friant Division of the Central Valley Project. The Agencies believe that the
3 actions identified in this *Framework for Implementation* provides a reasonable approach to
4 implementing the Settlement consistent with the Settlement Act.

5 This *Framework for Implementation* contains the following sections:

- 6 • Summary of Actions, Schedules, and Costs
- 7 • Funding
- 8 • Channel and Structural Improvement Actions, Schedules, and Costs
- 9 • Restoration Flow Actions, Schedule, and Costs
- 10 • Fish Reintroduction Actions, Schedules, and Costs
- 11 • Water Management Actions, Schedules, and Costs
- 12 • Options Appendix: listing of actions considered under the SJRRP
- 13 • Channel Capacity Appendix: description of seepage and levee stability projects
- 14 • Themes Appendix: description of the characteristics of a viable Program

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Figure 1 San Joaquin River Restoration Program Locations

2.0 Summary

Chapter 2 provides a summary of actions that satisfy the intent of the Settlement and Settlement Act, and also presents associated schedules and costs. These actions are necessary to release and convey Interim and Restoration flows, reintroduce fish, provide for fishery needs, and to reduce or avoid impacts on water deliveries. To compile potential actions, the Agencies drew information from their work on the Settlement, the *San Joaquin River Restoration Program's Program Environmental Impact Statement/Report* (PEIS/R), site-specific projects, and fisheries documents.

This *Framework for Implementation* meets the obligations specified in the Settlement and describes how the Agencies will establish a viable framework for accomplishing the Restoration Goal and Water Management Goal. For the purpose of this document, a viable set of actions for the Restoration Goal would result in the conveyance of non-damaging flows and provide, at a minimum, a migration corridor for adult and juvenile Chinook salmon to complete their life cycle. A viable set of actions for the Water Management Goal would result in the implementation of the actions in the Settlement and Settlement Act to reduce or avoid impacts to water deliveries as a result of Interim and Restoration flows.

To prioritize potential actions, the Agencies categorized them into themes to describe the characteristics of a viable program. These themes are as follows:

- Flow Management: releases from Friant Dam including scheduling, water acquisitions, banking, and permit requirements;
- Conveyance (Temperature): establishment of non-damaging channel capacities to allow for releases that provide for fish movement and maintain acceptable water temperatures. Potential actions to establish conveyance include levee setbacks for physical capacity, levee stability to maintain the flood control project, and seepage projects to reduce or avoid material adverse impacts from groundwater seepage;
- Entrainment Protection: screening of diversion facilities to prevent the loss of juvenile salmonids;
- Adult Migration Paths: construction of barriers to prevent the straying of adult anadromous fish into false migration pathways;
- Passage and Transportation: acceptable depths, velocities, and jump heights at structures and road crossings and the maintenance of access across the river, where required;
- Predation Protection: filling and isolation of gravel pits and other predator avoidance and predator management actions;
- Rearing Habitat: grading of floodplains and planting of riparian vegetation;
- Spawning and Incubation: habitat improvement, including gravel augmentation and artificial riffle construction;

- 1 • Fish Reintroduction: acquisition, transport, and management of source stocks including
2 hatchery construction, operation, and maintenance; and
- 3 • Water Management: reduction and avoidance of adverse impacts to water deliveries.

4 The Agencies determined a level of performance that would achieve a viable program within
5 each theme. To determine the level of performance, the agencies ranked the potential actions by
6 priority, and then grouped them into the following categories:

- 7 • Core: actions considered essential to the success of the program, where the Agencies are
8 certain that the action will result in a positive outcome, and where the absence of action
9 would result in program failure.
- 10 • Secondary: actions where the Agencies have a high level of confidence in a beneficial
11 outcome, but where the absence would not result in the failure to achieve the goals of the
12 Settlement and Settlement Act. For the Restoration Goal, some of these secondary actions
13 may be required to address the potential cumulative effects of fishery impairments.
14 Information gained through monitoring and analysis may result in secondary actions
15 becoming core or improvement actions (see below).
- 16 • Improvement: actions with uncertain benefits to the overall program. These actions are
17 thought to increase the program's success, but additional study and analysis is needed.
18 Information gained through monitoring and analysis may result in these actions becoming
19 secondary or core actions.

20 The Options Appendix provides a list of all actions considered in this document. The Themes
21 Appendix provides additional information on the ranking and categorization of actions as core,
22 secondary, or improvement. The completion of the core actions would result in establishing a
23 migration corridor that would allow adult and juvenile fish to complete their life cycle, while
24 also satisfying actions required by the Settlement and Settlement Act to reduce or avoid impacts
25 to water deliveries. The secondary or improvement actions propose to improve fish survival,
26 increase the river's carrying capacity (the number of fish that the river can support), and expand
27 water management activities. The Agencies will prioritize the core actions and manage the
28 secondary and improvement actions in a flexible manner that best achieves the Restoration and
29 Water Management Goals.

30 The program staff incorporated planning processes that provide structure and flexibility. Program
31 planning documents such as the *PEIS/R*, *Fisheries Management Plan*, and the *Seepage*
32 *Management Plan* provide the foundation to adaptively manage efforts to meet the Restoration
33 Goal. The Agencies intend to implement an Investment Strategy to help meet the Water
34 Management Goal. Methods to meet program goals will be revised as needed, reflecting changes
35 in strategy and information gained along the way. Enabling the power of scientific problem
36 solving into management actions through an adaptive management process has been previously
37 described (Healey 2001, Walters 1986, Instream Flow Council 2004).

38 Reintroduction of fish will be a process that relies on a variety of methods and techniques to
39 overcome impediments. Releasing smaller amounts of study fish allows the SJRRP staff to learn
40 how fish can be expected to behave and perform in the restored river, and provides pilot-scale
41 reintroduction activities that would inform future efforts. Upon the completion of the core
42 actions, the Agencies anticipate achieving a milestone where released Chinook salmon complete
43 their life cycle and contribute to the viability of future populations without human assistance.

1 Prior to this milestone, some of the study fish may return and provide additional information
 2 beyond their initial intended purpose and contribute to future populations through a trap and haul
 3 program.

4 The site-specific project teams developed several different alternatives that would meet the
 5 requirements of the Settlement and the Settlement Act. This *Framework for Implementation* uses
 6 average costs across potential combinations of alternatives to represent funding requirements and
 7 provides a potential schedule based on representative timeframes, but the preferred alternatives
 8 have not been selected. The *Record of Decision* for the *PEIS/R* and the site-specific projects will
 9 be evaluated to determine the specific alternative to be implemented.

10 **2.1 Actions**

11 Chapters 4 through 7 and the appendices provide the details on the core, secondary, and
 12 improvement actions. The Agencies identified the following actions for implementation based on
 13 meeting core needs and the Settlement:

- 14 • Program staffing for Reclamation, the Service, NMFS, DWR, and DFG
- 15 • Flow Management (Chapter 5)
 - 16 ○ Environmental Commitments
 - 17 ○ Flow Measurement
 - 18 ○ Monitoring of Physical and Biological Processes Including Fish and
 - 19 Reintroduction Studies
 - 20 ○ Unexpected Seepage Losses and Unreleased Restoration Flows
 - 21 ○ Seepage Improvements for Parcels Impacted at 4,000 cubic feet per second (cfs)
 - 22 Conveyance in 2A, 3, and 4A
 - 23 ○ Levee Improvements for Lengths Impacted at 4,000 cfs Conveyance in 2A, 3, 4A,
 - 24 and 5
- 25 • Channel and Structural Improvements (Chapter 4)
 - 26 ○ Chowchilla Bifurcation Structure Passage
 - 27 ○ San Joaquin River Control Structure Passage
 - 28 ○ Reach 2B Channel Capacity Improvements
 - 29 ○ Mendota Pool Bypass and Mendota Pool Fish Screen
 - 30 ○ Arroyo Canal Screening and Sack Dam Passage
 - 31 ○ Reach 4B, Eastside Bypass, and Mariposa Bypass Conveyance
 - 32 ○ Eastside Bypass Control Structure Passage
 - 33 ○ Mariposa Bypass Control Structure Passage
 - 34 ○ Mariposa Bypass Drop Structure Passage
 - 35 ○ Salt Slough Barrier and Mud Slough Barrier

- 1 • Fish Reintroduction (Chapter 6)
- 2 ○ Conservation Hatchery Construction, Operation, and Maintenance
- 3 ○ Donor Stock Collection
- 4 ○ Source Stock Monitoring
- 5 ○ Fish Releases
- 6 ○ Trap and Haul
- 7 • Water Management (Chapter 7)
- 8 ○ Recapture and Recirculation
- 9 ○ Recovered Water Account
- 10 ○ Friant Kern Canal and Madera Canal Capacity Restoration
- 11 ○ Part III Financial Assistance for Local Projects

12 The agencies will implement actions in an incremental manner, to the extent possible, where
13 subsequent work can build upon core actions and improve performance. For example, seepage
14 actions necessary to convey 1,300 cfs will use a design flow of 4,500 cfs, so that subsequent
15 efforts in other locations can achieve full conveyance flow rates throughout all reaches without
16 revisiting prior seepage sites.

17 The Agencies identified the following actions as secondary:





- 18 • Increased Conveyance in Reaches 2A, 3, 4A, and 5 from 4,000 cfs to 4,500 cfs
- 19 • Floodplain Improvements
- 20 • Spawning Gravel Augmentation
- 21 • Gravel Pit Filling and Isolation
- 22 • San Mateo Road Crossing
- 23 • Chowchilla Bypass Passage at Crossings
- 24 ○ Avenue 18 ½
- 25 ○ Avenue 21
- 26 • Eastside Bypass Passage at Crossings and Structures
- 27 ○ Dan McNamara Road
- 28 ○ Merced National Wildlife Refuge Weirs
- 29 • Friant-Kern Canal Reverse Flow Pump-Back Facilities
- 30 • Other Water Management Projects

31 Secondary actions would be implemented as funds become available, either through the
32 remaining appropriations, savings realized upon further development of core items, future
33 appropriations, or through partnerships with Federal, State, and non-profit funding sources.

1 Monitoring and analysis may shift secondary and improvement actions toward more important
2 needs as new information becomes available.

3 **2.2 Schedule**

4 The schedule provides the approximate year for initiating the project phases required to complete
5 the core actions. Table 1 shows the schedule, by project, for the different phases color-coded as
6 follows:

- 7 •  Formulation and Environmental Compliance: development and selection of a
8 preferred alternative including National Environmental Policy Act (NEPA) and
9 California Environmental Quality Act (CEQA) compliance and permitting
- 10 •  Final Design, Design Data Collection, Land Acquisition: development of
11 specifications and bid packages and the acquisition of required lands
- 12 •  Construction: contract award, mobilization and management of construction
- 13 •  Operations and Maintenance: long-term operating requirements

14 A project is assumed to be functional and meeting program requirements in the year following
15 the end of the construction phase. Where different alternatives exist for a particular action, the
16 average was used as a placeholder.

17 The Agencies plan to overlap project phases to accelerate completion, where possible. The
18 schedule assumes that the Agencies will proceed with environmental compliance activities based
19 on appraisal-level designs. Development of the feasibility-level designs concurrent with the
20 completion of the environmental compliance activities will provide information for gathering
21 design data; therefore, accelerating completion of a project.

22 The schedule also evaluates the critical path and the dependencies between projects. As
23 described above, reintroduction will occur as a process that relies on a variety of methods and
24 techniques to overcome impediments. Fish reintroduction will begin with the collection and
25 release of study fish. Pilot programs, initially using spring-run brood stock from the Feather
26 River Hatchery, will be augmented with other wild stocks, as stock status and permitting allows.
27 The timeline for reintroduction process follows:

- 28 • 2010 and 2011 – Studies using juvenile fall-run salmon and eggs to inform reintroduction
29 actions begin. Fall-run brood stock used in Interim Facility to test actions for
30 Conservation Facility.
- 31 • 2012 and 2013 – Spring-run brood stock will be collected and raised in the Interim
32 Facility and the Agencies will prepare for larger scale operations. Studies will be
33 implemented with fall-run and spring-run juvenile study fish in the river and an
34 opportunistic trap and haul program will be implemented for adult fish throughout the
35 Restoration Area.
- 36 • 2014 – Release of study fish with opportunistic trap and haul of adult fish and collection
37 of brood stock continue. Fish released under studies may return unaided to the
38 downstream based of Mendota Pool in two years.

- 1 • 2015 – Completion of the Conservation Facility provides the capacity for larger numbers
2 of brood stock and eggs and juveniles necessary for full-scale reintroduction. Release of
3 study fish and opportunistic trap and haul of adult fish and collection of brood stock
4 continue.
- 5 • 2016 – Completion of fish passages at flow control structures allows for returning adult
6 salmon to migrate to the downstream base of Mendota Dam, where a trap and haul
7 program provides passage. Fish are released in sufficient numbers and for the sole
8 purpose that that a portion of these fish will complete their life cycle and contribute to
9 future populations. Release of study fish and collection of brood stock continue.
- 10 • 2017 – The Conservation Facility operates at full potential, and fish releases are
11 expanded to the full reintroduction scale. Non-damaging capacities may approach 1,300
12 cfs based on Mendota Pool constraints. Release of study fish and collection of brood
13 stock continue.
- 14 • 2018 and 2019 – The Mendota Pool Bypass will be in its third year of construction, and
15 an intensive trap and haul program at Mendota Dam provides for upstream adult salmon
16 passage. Juvenile fish and eggs reintroduced at this time will not likely return until
17 completion of the Mendota Pool Bypass in 2020. Reintroduction scale releases, study
18 fish, and collection of brood stock continue.
- 19 • 2020 – Completion of the Mendota Pool Bypass reduces the need for trap and haul and
20 allows for releases above 1,300 cfs. Introduced Chinook salmon species can complete
21 their life cycle and contribute to the viability of future populations without substantial
22 handling.
- 23 • 2020 to 2025 – Continued implementation of channel and structural improvements
24 increases fisheries performance with the objective of meeting the Restoration Goal.

25 **2.3 Costs**

26 Overall project costs were based on the cost estimating procedures of Reclamation and DWR,
27 which generally represent an appraisal level of detail. Table 1 shows the annual estimated costs
28 of activities in the millions of dollars. Costs include:

- 29 • Formulation: varies depending upon the project;
- 30 • Final Design: estimated at 1% of total construction costs;
- 31 • Data Collection and Land Acquisition: estimated at 4% of total construction costs;
- 32 • Construction: specified by engineering options sheets consistent with joint Reclamation
33 and DWR estimating practices for the SJRRP; and
- 34 • Operations and Maintenance: varies from 1% to 10% depending on the project.

35 The estimates used the average cost of alternatives on site-specific projects where multiple
36 options exist. Cost estimates use representative values for seepage and levee stability projects. At
37 the appraisal level of detail, differences in annual construction costs cannot reasonably be

1 distinguished during multi-year projects, so estimates evenly distribute the construction costs
2 over the number of years.

3 The costs for levee stability were separated from the Program total due to uncertainty in which
4 agencies and entities would be responsible for providing the funding to establish conveyance at
5 design capacities. The Agencies will work together to identify sources of funding to accomplish
6 levee stability work.

7 **2.4 Uncertainties and Potential Changes**

8 The following uncertainties exist with respect to actions, schedule, and costs:

- 9 • Although not identified as a core need, consultation with the Settling Parties resulted in
10 the inclusion of the Reach 2B capacity improvement as part of the core actions to remain
11 consistent with the Settlement. Achieving minimum conveyance with the Mendota Pool
12 Bypass alone is possible but not certain and may require construction of the Reach 2B
13 levees.
- 14 • Although not identified as a core need, consultation with the Settling Parties resulted in
15 the inclusion of barriers in the area of Salt and Mud Slough as part of the core actions to
16 remain consistent with the Settlement. This *Framework for Implementation* includes the
17 construction of a barrier on Salt Slough and the construction of a barrier on Mud Slough.
18 Deployment of barriers may be accomplished through coordination with other entities
19 which could be a possible source of additional funds.
- 20 • Although not identified as a core need, consultation with the Settling Parties identified
21 the inclusion of actions over 2,000 cfs to convey up to 4,500 cfs through the Restoration
22 Area to remain consistent with the Settlement. The Settlement does not specify
23 conveyance actions in Reaches 2A, 3, 4A, or 5, but envisioned the ability to release the
24 flow rates specified on Tables 1A-F in Exhibit B. This *Framework for Implementation*
25 includes the construction of seepage and levee stability projects up to 4,000 cfs. The
26 remaining 500 cfs was left as a secondary action.
- 27 • Generally, appraisal-level costs are not sufficient for seeking appropriations and
28 authorization, but they do distinguish the relative difference between alternatives.
29 Estimates include a 25% contingency for potential increases in costs. Further
30 development of designs may reduce the contingency to some extent and better define
31 costs.
- 32 • The range of options for site specific projects includes some combinations that fall above
33 and some combinations that fall below the estimated available funding. The Agencies
34 and parties will seek ways to reduce costs during the development of site-specific
35 projects so that total costs fall within the available budget.
- 36 • The approaches for the Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and
37 Structural Improvements Project will influence the required levee stability projects for
38 conveyance in the Eastside and Mariposa bypasses. The aggregate cost for the Reach 4B
39 Conveyance channel and structural improvements do not include costs for levee setbacks

- 1 or raises in the Eastside and Mariposa Bypasses. Selection of an alternative that requires
2 modifications to bypass levees would require some of the levee stability actions.
- 3 • The construction of passage facilities on alternative routes (Chowchilla Bypass, Eastside
4 and Mariposa Bypasses under a Main Channel Alternative for Reach 4B) assumes design
5 criteria for adult Chinook salmon during periods of operation for flood management and
6 water supply deliveries. Other fish can potentially navigate these facilities with minor
7 modifications and will likely pass through structure bays during some years, but such
8 criteria did not drive the designs. The selected high flow route is anticipated to provide
9 passage for fish other than adult Chinook salmon in most years. The Agencies will
10 evaluate the needs of sturgeon and other fish to address this uncertainty.
 - 11 • Collection and transportation of wild source stock may require waiting additional years,
12 until conditions are sufficient to support taking some individuals from these stocks.
13 Delayed implementation and smaller trial scale collection efforts may result in shifting
14 costs to later dated once methods and techniques for collecting wild source stocks are
15 more certain.
 - 16 • Trap and haul provides an interim measure while the Agencies complete passage
17 improvements. The extent and scope of the trap and haul program will change with the
18 understanding of passage improvements and the completion of additional facilities.
 - 19 • The Agencies coordinate extensively with partners and stakeholders who occasionally
20 request more detailed investigation of the options that have been excluded on the basis of
21 preliminary analysis and professional judgment. Investigating these alternatives beyond
22 the screening level analyses increases data collection costs, extends design times, and
23 delays construction. The Agencies intend to work with partners and stakeholders to
24 clearly articulate assumptions and will engage them in the technical merits leading to
25 conclusions.
 - 26 • DFG and DWR have not identified funding for participation after 2017. Costs were
27 included in the estimates because it is assumed that further participation in the SJRRP
28 will be authorized from future State bonds in support of the State commitment or
29 provided through agreements with other agencies.
 - 30 • The level of survival will be unknown until fish are reintroduced and monitored. The
31 Agencies will monitor fish and adaptively manage secondary and improvement actions as
32 information and funding becomes available.
 - 33 • Actions within operations and maintenance include the hatchery, fish screen facilities,
34 and seepage projects. The Agencies assume that other channel and structural
35 improvement projects will result in negligible change in costs to the existing maintaining
36 authorities. Designs for actions without explicitly identified funding for operations and
37 maintenance aim to provide self-maintaining conveyance and minimal facility operation
38 costs. The site-specific projects describe the methods.
 - 39 • Uncertainties will be managed through an approach that will allow the program to: (1)
40 maximize the likelihood of success, (2) increase learning opportunities, (3) identify data
41 needs and reduce uncertainties, (4) use the best available information to provide technical

1 support and increase the confidence in future decisions and recommendations, and (5)
2 prioritize management actions.

- 3 • While the Framework describes fish reintroduction as a "process," the Settlement
4 contemplates reintroduction of fish as a point in time with respect to Paragraph
5 20(d)(1)(B) ("...the following criteria shall be considered...beginning 7 years after the
6 reintroduction of spring run chinook (sic) salmon to the San Joaquin River, whether the
7 annual escapement of wild spring run adult salmon has dropped below 500 in any
8 year..."). The 2025 timeframe for evaluating requests to change flows assumed three
9 lifecycles of salmon. The revised schedule within the framework may change the
10 expected evaluation.
- 11 • The Framework includes monitoring of source stock populations in the event that
12 insufficient information exists to make determinations on take. Under some
13 circumstances sufficient information may be available and would reduce costs.

Framework for Implementation San Joaquin River Restoration Program

1

Table 1 – Phases, Schedule, and Costs in Millions for Core Actions

Action	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Program Staffing	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$78.00
U.S. Bureau of Reclamation														
U.S. Fish and Wildlife Service														
U.S. National Marine Fishery Service														
CA Department of Water Resources														
CA Department of Fish and Game														
Flow Actions														
Mitigation and Conservation Strategy	\$6.82	\$4.51	\$4.31	\$1.31	\$1.31	\$2.81	\$1.31	\$2.81	\$1.31	\$2.81	\$1.31	\$2.81	\$1.31	\$34.71
Millerton Lake Boat Ramps														
Conservation Strategy														
Invasive Species Control														
Channel Capacity Advisory Group														
Consultation on Increased Flows														
Programmatic Cultural Resources														
Flow Management and Monitoring	\$4.85	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$3.35	\$45.05
Stream Gage														
Acquire Water														
Bank or Store Water														
Physical and Biological Processes														
Seepage	\$7.00	\$1.94	\$9.20	\$5.07	\$6.11	\$6.60	\$6.60	\$6.60	\$6.60	\$6.60	\$6.60	\$4.88	\$4.88	\$78.67
300 cfs Conveyance														
700 cfs Conveyance														
1300 cfs Conveyance														
2000 cfs Conveyance														
4000 cfs Conveyance														
Channel and Structural Improvements	\$26.13	\$40.33	\$79.44	\$89.22	\$89.22	\$89.22	\$89.22	\$0.70	\$0.70	\$0.70	\$0.70	\$0.70	\$0.70	\$506.96
Chowchilla Bifurcation Structure														
San Joaquin River Control Structure														
Reach 2B Conveyance														
Mendota Pool Bypass														
Mendota Pool Fish Screen														
Arroyo Canal and Sack Dam														
Reach 4B Conveyance														
Eastside Bypass Control Structure														
Mariposa Bypass Control Structure														
Mariposa Bypass Drop Structure														
Salt and Mud Slough Area Barriers														
Fish Reintroduction	\$3.68	\$10.12	\$10.55	\$5.12	\$5.12	\$5.12	\$2.43	\$1.13	\$1.13	\$1.13	\$1.13	\$1.13	\$1.13	\$48.94
Conservation Hatchery														
Donor Stock Collection														
Monitoring of Source Streams														
Trap and Haul														
Water Management	\$12.52	\$16.85	\$20.85	\$20.85	\$9.77	\$9.77	\$4.77	\$0.77	\$0.77	\$0.77	\$0.77	\$0.77	\$0.77	\$100.00
Recapture and Recirculation Funding														
Friant-Kern and Madera Canal Capacity														
Part III Projects														
Sub-Total (without Levee Stability)	\$67.0	\$83.1	\$133.7	\$130.9	\$120.9	\$122.9	\$113.7	\$21.4	\$19.9	\$21.4	\$19.9	\$19.6	\$18.1	\$892.3
Levee Stability														
Levee Stability in 2A, 3, 4A, and 5	\$2.74	\$0.00	\$0.10	\$2.71	\$10.74	\$10.13	\$10.13	\$10.13	\$10.13	\$10.13	\$10.13	\$10.13	\$10.13	\$97.34
700 cfs Conveyance														
1300 cfs Conveyance														
2000 cfs Conveyance														
4000 cfs Conveyance														
Eastside Bypass Levee Stability	\$0.00	\$0.97	\$24.63	\$9.66	\$13.62	\$9.19	\$19.38	\$14.12	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$91.57
700 cfs Conveyance														
1300 cfs Conveyance														
2000 cfs Conveyance														
2500 cfs Conveyance														
3500 cfs Conveyance														
4000 cfs Conveyance														
Formulation														
Final Design and Acquisition														
Construction														
Ongoing Operations and Maintenance														

2

3.0 Funding

Chapter 3 provides an estimate of the potential funding available to implement the SJRRP. Funding comes from a variety of Federal and State sources. Table 2 provides the anticipated funding available through fiscal year 2025. For the purpose of this analysis, available funds include those authorized by Federal and State law. All funding, with the exception of \$88 million from the San Joaquin River Restoration Fund, is subject to further appropriation.

Table 2 – Anticipated Total Funding Available to Implement the SJRRP through Fiscal Year 2025.

Funding Source	Total Anticipated Funding Available
San Joaquin River Restoration Fund	
Friant Capital Repayment (1)	\$245,149,000
Friant Surcharge (2)	\$89,356,000
Receipts from Sales of Water or Land (3)	\$21,552,000
Central Valley Project Restoration Fund (4)	\$45,000,000
New Federal Appropriations (5)	\$300,000,000
State Bond Funds	\$200,000,000
Total	\$892,056,000

Notes: For the purposes of this analysis, funding available includes funds authorized by Federal and State law. All of this funding, with the exception of \$88 million from the San Joaquin River Restoration Fund, is subject to further appropriation.

1. Estimated based on capital repayment to date, negotiated repayment contracts, and anticipated repayment amounts prior to negotiated repayment contracts along with anticipated amounts from the contractors that did not execute repayment contracts.
2. Assumes long-term average Class 1 and Class 2 water sales of 800,000 acre-feet. Includes actual collections from fiscal year 2010 and 2011. Future collections are estimated at \$5.6 million per year until fiscal year 2019, when they reduce to \$3.2 million per year (surcharge rate changes from \$7/acre-foot to \$4/acre-foot).
3. Assumes ramp-up of water sales over time to a long-term average of \$1.5 million collected per year.
4. Includes actual funding provided from fiscal year 2007 to fiscal year 2011 and an anticipated \$2 million from fiscal year 2012 to 2025.
5. Includes funding provided in Section 10009(b)(1) and Section 10203(c) of Public Law 111-11.

Since implementation of the SJRRP began in 2007, some funds have been expended. Table 4 identifies funds expended from fiscal year 2007 to fiscal year 2012 and the remaining funds available. As shown in Table 4, an estimated \$99,283,000 will have been expended by the end of fiscal year 2012. Approximately \$792,774,000 remains to implement the SJRRP through fiscal year 2025.

The remaining funds represent a conservative value, because the assumptions for collection of the Friant surcharge and the receipts from sales of water or land. For planning purposes, Reclamation has assumed a long-term average Class 1 and Class 2 water sales of 800,000 acre-feet. Historically, Class 1 and Class 2 water sales have averaged 1.2 million acre-feet. Although the implementation of the Settlement would reduce Class 1 and Class 2 water sales, based on historical deliveries and anticipated releases to the river under the Settlement, it is likely that long-term average Class 1 and Class 2 water sales would be greater than 800,000 acre-feet, resulting in additional funds collected as part of the Friant surcharge. In addition, and as described elsewhere in this document, it is likely that the full Restoration Flows would not be

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1 released into the San Joaquin River for some time. Consistent with Paragraph 13(i) of the
2 Settlement and Section 10009(b)(1)(C) of PL 111-11, the Secretary, in consultation with the
3 Restoration Administrator, shall, under certain conditions, bank, store, exchange, transfer or sell
4 any unused Restoration Flows, with proceeds of such transfer or sale deposited into the San
5 Joaquin River Restoration Fund. The long-term receipts of \$1,500,000 from the sale of water or
6 land may be conservative. For these reasons, this *Framework for Implementation* is assuming
7 that roughly \$800 million is available to implement the SJRRP through Fiscal Year 2025.
8

9 **Table 3 – Funds Expended from Fiscal Year 2007 to Fiscal Year 2012 and Remaining Funds Available to Implement the**
10 **SJRRP through Fiscal Year 2025**

11

Funding Source	Total Anticipated Funding Available (1)	Expenditures from Fiscal Year 2007 to 2012 (2)	Remaining Funding Available
San Joaquin River Restoration Fund	\$347,057,000	\$20,147,000	\$326,910,000
Central Valley Project Restoration Fund	\$45,000,000	\$27,263,000	\$17,737,000
New Federal Appropriations	\$300,000,000	\$7,852,000	\$292,148,000
State Bond Funds	\$200,000,000	\$44,021,000	\$155,979,000
Total	\$892,057,000	\$99,283,000	\$792,774,000

Notes: For the purposes of this analysis, funding available includes funds authorized by Federal and State law. All of this funding, with the exception of \$88 million from the San Joaquin River Restoration Fund, is subject to further appropriation.

1. See notes in Table 1 for assumptions.
2. Fiscal Year 2007 to 2011 expenditures from *Approved, Obligated and Expended Funds, Fiscal Year 2007-2011, San Joaquin River Restoration Program*. Fiscal Year 2012 expenditures are estimated.

12
13

4.0 Channel and Structural Improvements

Channel and structural improvement actions include the modifications to the river channel, floodplain, and infrastructure to achieve the Restoration Goal. The Agencies developed actions through the analysis undertaken for the *PEIS/R*, the site-specific projects addressing Paragraph 11(a) actions, fisheries documents and other planning efforts. Larger project activities were broken down into components called options. Each option has independent functionality and provides alternative approaches to achieve one or more objectives. Site-specific projects combine options to achieve multiple objectives for a channel or structural improvement. The Options Appendix, Themes Appendix, and Schedule Appendix provide the supporting information for the actions, costs, and schedule of the channel and structural improvements described in this chapter. The Themes Appendix describes the fisheries evaluations to classify a project as core, secondary, or improvement.

4.1 Actions

Fishery evaluations revolved around the themes of conveyance, fish passage, juvenile entrainment and predation, false adult migration pathways, and habitat creation. Potential actions were included in one or more themes and designated as core, secondary, or improvement based on the necessary level of performance to achieve a viable program. Analyses of temperature simulations indicate the need to convey at least 2,000 cfs as part of the core program. The Agencies assumed that adult salmon will enter the flood bypasses during wet years. If the adult salmon cannot navigate the channel and structures within the bypass in order to reach spawning areas in Reach 1 then the bypasses to become false migration pathways.

The Agencies identified a reliable passage corridor as particularly important, since fish will need to move down and up the system to complete their life cycle. Adult salmon must be able to return to spawn for reintroduction to be successful. Adult passage impediments can serve as a complete barrier that does not allow salmon to continue migrating to spawning grounds. Major losses through juvenile entrainment can also preclude restoring salmon populations to the San Joaquin River. Actions to reduce juvenile entrainment were identified as core actions, where the Agencies expect very frequent and a high degree of juvenile loss to occur.

Because of the importance placed on reliable passage and flow conveyance levels, several channel and structural improvements have been included in the core program as described below:

- **Chowchilla Bifurcation Structure Passage:** Construction of a fish ladder or ramp will allow adult fish within the Chowchilla Bypass as a result of flood flows to return to the main stem to access Reach 1. Water velocities at the existing structure are expected to exceed fish passage criteria during flood flows, which would create an impediment to adult fish passage.
- **San Joaquin River Control Structure Passage:** This would include the construction of a fish ladder or ramp on the existing structure or the replacement of the structure as part of

1 water supply facilities for Mendota Pool. Hydraulic analysis indicates that water
2 velocities during flood flows would exceed criteria for adult Chinook salmon passage at
3 the existing structure.

- 4 • Reach 2B Channel Capacity Improvements: This would include construction of levees
5 for 4,500 cfs capacity without engineering floodplain habitat through grading or planting
6 of vegetation. Temperature criteria identified conveyance of 2,000 cfs as a core action.
7 Although the construction of the Mendota Pool Bypass may accomplish non-damaging
8 conveyance near 2,000 cfs, the Agencies included this as a core action to meet the
9 requirements in Paragraph 11(a) of the Settlement.
- 10 • Mendota Pool Bypass: This would include construction of a bypass channel around
11 Mendota Pool or building a dam in the Fresno Slough and related water supply
12 infrastructure. Evaluations of expected diversion rates and field studies on fish survival
13 identified Mendota Pool as a potential major source of juvenile salmon loss through
14 entrainment into water diversions in most years. Directing fish around the Mendota Pool
15 or moving the Mendota Pool into Fresno Slough would resolve this concern.
- 16 • Arroyo Canal Screening and Sack Dam Passage: This would include construction of a
17 fish screen on the Arroyo Canal and passage facilities at Sack Dam. Arroyo Canal was
18 identified as very likely to entrain a large proportion of juvenile salmon. Screening the
19 canal would avoid this loss. Sack Dam has been identified as a passage impediment for
20 adult salmon of sufficient magnitude to warrant classification as a core need when the
21 boards are in place. In the spring, the drop height would impede upstream passage.
- 22 • Reach 4B, Eastside Bypass, and Mariposa Bypass Conveyance: This would include
23 construction of flow routing facilities at the Sand Slough Control Structure, levee
24 construction or repair, low-flow channel excavation, and transportation crossing
25 improvements in either the old river channel or the flood bypass system. A series of
26 channel capacity constraints in these areas prevent the conveyance of 4,000 cfs.
- 27 • Eastside Bypass Control Structure Passage: This would include construction of a fish
28 ladder or ramp. Excessive velocities at the existing structure during flood flows exceed
29 the fish passage criteria of 5 feet per second (fps) and impede adult upstream migration.
- 30 • Mariposa Bypass Control Structure Passage: This would include construction of passage
31 in coordination with a drop structure and low-flow channel modifications. Excessive
32 velocities at the existing structure exceed fish passage criteria maximums and would
33 impede upstream adult migration.
- 34 • Mariposa Bypass Drop Structure Passage: This would include construction of passage in
35 coordination with a control structure and low-flow channel modifications. This drop
36 structure is an adult passage impediment at all flow levels. Modification or removal
37 would allow fish to pass.

38 Excessive mortality of juvenile salmon, false migration paths for adults, and lack of habitat can
39 reduce the effectiveness of salmon reintroduction. Actions designated as secondary based on the
40 degree of expected impairment and certainty of impacts or benefits on the reintroduction
41 program include:

- 1 • Conveyance Improvements: Seepage and levee stability projects to increase to convey
2 flows above up to 4,500 cfs would provide temperature benefits and potentially greater
3 wetted areas for juvenile habitat.
- 4 • Floodplain Improvements (Grading and Vegetation): Floodplain grading and vegetation
5 actions would jumpstart the productive potential of flood plain habitat for juvenile
6 salmon. The core conveyance actions described above assume minimal or no actions to
7 plant and grade in the floodplain areas.
- 8 • Spawning Habitat Augmentation: Surveys within the Restoration Area identified quality
9 spawning gravel in the upper reaches, but some degree of gravel augmentation may be
10 necessary to support reintroduction objectives.
- 11 • Gravel Pit Filling and Isolation: The gravel pits within the Restoration Area have been
12 identified as potential contributors to juvenile salmon loss. The gravel pits provide habitat
13 for predatory fish, and the slow current through these pools can expose juvenile salmon
14 to high predation mortality. The program's current study on predator populations and
15 juvenile salmon survival in these pits will advise future actions.
- 16 • San Mateo Road Crossing: The San Mateo Avenue road crossing was identified as a
17 potential adult migration impediment, but the significance of this barrier for adult passage
18 is uncertain. At high flows, adult passage is not expected to be impaired, but monitoring
19 should be implemented to determine the degree to which the crossing would delay or
20 impede passage.
- 21 • Chowchilla Bypass Passage at Crossings Avenue 18 ½ and Avenue 21: Fish are expected
22 to migrate up the Chowchilla Bypass during flood flows and may encounter these
23 crossings. Hydraulic analysis indicates a high elevation drop at each one. Modification
24 of these crossings would increase our confidence in fish migration within the Chowchilla
25 Bypass and their return to the main stem under flood conditions.
- 26 • Eastside Bypass Passage at Crossings and Structures:
 - 27 ○ Dan McNamara Road: This road crossing could potentially have an impact on
28 adult migration, but it is not believed to completely impede upstream passage.
 - 29 ○ Merced National Wildlife Refuge Weirs: The Merced Refuge weir can present a
30 vertical drop barrier for upstream migrating salmon under low to moderate flow
31 conditions. This barrier is expected to be more of a passage impediment for fall-
32 run Chinook, because they migrate at lower flows than spring-run Chinook in
33 most years. Operation of the weir, such as removing the flashboards, may resolve
34 this impediment.
- 35 • Salt and Mud Slough Barriers: Salt and Mud sloughs represent potential false migration
36 pathways for adult salmon. The amount of water coming out of these sloughs, along with
37 past observations of fall-run Chinook straying into Mud and Salt slough, suggest that a
38 high percentage of migrating salmon could be attracted into them. The percentage of
39 adult fish that would stray into these sloughs, and the fate of those that do, is not known;
40 but there is potential for major losses. Barriers would prevent fish from entering these
41 sloughs and potential loss of fish would be avoided.

42 Actions identified as potential improvements include:

- 1 • Screening of Riparian Holding Contract Diversions (Reach 1)
- 2 • Lone Willow Slough Screening (Reach 2B)
- 3 • King’s River Fish Barrier (Reach 2B)
- 4 • Fresno River, Ash and Berenda Slough False Migration Barriers (Chowchilla Bypass)
- 5 • Washington Avenue Bridge Replacement (Reach 4B)
- 6 • Turner Island Road Bridge Replacement (Reach 4B)
- 7 • El Nido Road Crossing Passage (Eastside Bypass)
- 8 • Chamberlain Road Crossing (Eastside Bypass)
- 9 • Mariposa Bypass Road Crossing (Bypass)
- 10 • Newman Wasteway Barrier (Reach 5)
- 11 • Other Barriers (Reach 5)
- 12 These actions are described in more detail in the Options Appendix.

13 **4.2 Schedule**

14 Schedules include the necessary environmental compliance, final design, design data collection,
15 bidding, and construction. For actions with environmental compliance currently underway, the
16 schedule uses the estimated date for the Record of Decision. The *Reclamation Final Design*
17 *Manual* includes a 3-year timeframe for design, data collection, and development of bid
18 packages for acquisition. Construction schedule estimates use the longer of timeframes where
19 alternatives exist. The estimated schedules for core actions are provided below.

- 20 • Chowchilla Bifurcation Structure Passage
 - 21 ○ NEPA/CEQA compliance begins in 2014
 - 22 ○ Final Design begins in 2014
 - 23 ○ Construction begins in 2015
 - 24 ○ Operational begins in 2016
- 25 • San Joaquin River Control Structure Passage
 - 26 ○ NEPA/CEQA: to be completed 2013 as part of the Mendota Pool Bypass and
 - 27 Reach 2B Channel Capacity Improvements Site-Specific Project.
 - 28 ○ Final Design begins in 2014
 - 29 ○ Construction begins in 2015
 - 30 ○ Operational beginning in 2016
- 31 • Reach 2B Channel Capacity Improvements
 - 32 ○ NEPA/CEQA: to be completed 2013 as part of the Mendota Pool Bypass and
 - 33 Reach 2B Channel Capacity Improvements Site-Specific Project.

- 1 ○ Final Design begins in 2014
- 2 ○ Construction begins in 2016
- 3 ○ Operational begins in 2020
- 4 • Mendota Pool Bypass
 - 5 ○ NEPA/CEQA: to be completed 2013 as part of the Mendota Pool Bypass and
 - 6 Reach 2B Channel Capacity Improvements Site-Specific Project.
 - 7 ○ Final Design begins in 2014
 - 8 ○ Construction begins in 2016
 - 9 ○ Operational begins in 2020
- 10 • Arroyo Canal Screening and Sack Dam Passage
 - 11 ○ NEPA/CEQA: to be completed 2012 as part of the Arroyo Canal and Sack Dam
 - 12 Site-Specific Project
 - 13 ○ Final Design begins in 2012
 - 14 ○ Construction begins in 2013
 - 15 ○ Operational begins in 2015
- 16 • Reach 4B, Eastside Bypass, and Mariposa Bypass Conveyance
 - 17 ○ NEPA/CEQA: to be completed 2013 as part of the Reach 4B, Eastside Bypass,
 - 18 and Mariposa Bypass Channel Capacity Improvements Site-Specific Project
 - 19 ○ Final Design begins in 2014
 - 20 ○ Construction begins in 2016
 - 21 ○ Operational begins in 2020
- 22 • Eastside Bypass Control Structure Passage
 - 23 ○ NEPA/CEQA: to be completed 2013 as part of the Reach 4B, Eastside Bypass,
 - 24 and Mariposa Bypass Channel Capacity Improvements Site-Specific Project
 - 25 ○ Final Design begins in 2014
 - 26 ○ Construction begins in 2015
 - 27 ○ Operational begins in 2016
- 28 • Mariposa Bypass Control Structure Passage
 - 29 ○ NEPA/CEQA: to be completed 2013 as part of the Reach 4B, Eastside Bypass,
 - 30 and Mariposa Bypass Channel Capacity Improvements Site-Specific Project
 - 31 ○ Final Design begins in 2014
 - 32 ○ Construction begins in 2015
 - 33 ○ Operational begins in 2016
- 34 • Mariposa Bypass Drop Structure Passage

- 1 ○ NEPA/CEQA: to be completed 2013 as part of the Reach 4B, Eastside Bypass,
2 and Mariposa Bypass Channel Capacity Improvements Site-Specific Project
- 3 ○ Final Design begins in 2014
- 4 ○ Construction begins in 2015
- 5 ○ Operational begins in 2016

6 The implementation of secondary actions will be prioritized based upon the collection and
7 analysis of additional data. Secondary actions will generally lag behind core actions, but some
8 secondary actions may occur concurrently with core actions. Some secondary actions are
9 addressed as part of existing site-specific studies. Other secondary actions will require additional
10 study, formulation, and environmental compliance.

11 The implementation of improvement actions depends upon the collection of additional data and
12 analysis to prioritize actions. Improvement actions will generally occur after secondary actions.

13 **4.3 Costs**

14 Costs are based on pre-appraisal and appraisal levels of detail. Appraisal level costs include
15 assumptions on the necessary size and scope of engineering efforts, because detailed site-specific
16 information on the actual material properties and conditions present at the project site are not
17 available. The cost estimates include contingencies to address potential changes in the
18 assumptions as additional information becomes available. These contingencies create an upper
19 bound on cost estimates. Planning contingencies used by Reclamation and DWR include:

- 20 • Mobilization (5%) – level of effort on the site before work begins
- 21 • Design Contingency (15%) – additional construction elements not explicitly listed on the
22 design sheet at this level of detail
- 23 • Contingencies (25%) – unforeseeable changes that may increase costs
- 24 • Non-Contract Costs (35%) – costs not directly associated with construction of the project
25 including staffing, right-of-way, environmental compliance, site studies, and similar
26 activities

27 Final design work varies depending upon the size and complexity of a project. The following
28 assumptions were used in costing design and data collection efforts that are necessary to bring
29 projects to bidding and award:

- 30 • Design Work – 1% of appraisal level construction estimate
- 31 • Data Collection – 4% of appraisal level construction estimate

32 The selection of alternatives for the Mendota Pool Bypass and the conveyance of flows through
33 Reach 4B or the Eastside Bypass and the Mariposa Bypass substantially vary the overall cost of
34 the core program. Alignment 4 for Reach 2B and Alignment C for Reach 4B provide an upper
35 bound as representative costs for levee construction and land acquisition. The Options Appendix
36 lists costs for alternative approaches. Costs do not include floodplain grading or planting. Costs
37 for core channel and structural improvement actions must combine alternatives from each of the
38 first-level bullets. Sub-level bullets provide the breakdown.

- 1 • Chowchilla Bifurcation Structure: \$8 million
 - 2 ○ NEPA/CEQA: \$0.5 million (approximated because NEPA/CEQA has not been
 - 3 initiated)
 - 4 ○ Final Design: \$0.37 million
 - 5 ○ Land Acquisition: minimal
 - 6 ○ Construction: \$7.30 million, pre-appraisal based on San Joaquin River Control
 - 7 Structure estimates
- 8 • San Joaquin River Control Structure Passage: \$8 to \$24 million depending upon the
- 9 Mendota Pool Bypass alternative (see below).
- 10 • Reach 2B Conveyance: \$121 million, based on Alignment 4 for a upper bound on land
- 11 acquisition
 - 12 ○ Final Design: \$5.76 million, 5% for design work and data collection
 - 13 ○ Land Acquisition: \$27 million
 - 14 ○ Construction: \$88.11 million including relocations, levee construction, partial
 - 15 removal of existing levees, and riprap bank protection on bend 10
- 16 • Mendota Pool Bypass: varies based on alternative selected
 - 17 ○ Compact Bypass Alignment: \$174 million
 - 18 ▪ San Joaquin River Control Structure Fish Ladder: \$7.7 million
 - 19 • Final Design: \$0.37 million, 5% for design work and data
 - 20 collection
 - 21 • Construction: \$7.3 million, based on a left bank fish ladder
 - 22 ▪ Bypass Channel: \$167 million
 - 23 • Final Design: \$7.9 million, 5% for design work and data collection
 - 24 • Land Acquisition: \$6.7 million for the bypass footprint and
 - 25 alignment 5 extension levees
 - 26 • Bypass Channel Control Structure and Fish Ladder: \$15.7 million
 - 27 • Bypass Channel Excavation and Levees
 - 28 ○ Bypass Levees: \$15 million
 - 29 ○ Channel Excavation: \$31 million
 - 30 ○ Extension Levees: \$35.22 million including relocations and
 - 31 levee construction
 - 32 • Mendota Pool Control Structure: \$10.5 million
 - 33 • Mendota Pool Fish Screen: \$27 million
 - 34 • Columbia Canal Siphon: \$17.5 million

- 1 ○ Fresno Slough Dam Reforming the Pool: \$209 million
- 2 ▪ San Joaquin River Control Structure Fish Ladder: \$7.7 million
- 3 • Final Design: \$0.37 million, 5% for design work and data
- 4 collection
- 5 • Construction: \$7.3 million, based on a left bank fish ladder
- 6 ▪ Fresno Slough Dam: \$201 million
- 7 • Final Design: \$9.57 million
- 8 • Land Acquisition: \$5.8 million based on alignment 5 extension
- 9 levees and short canal land acquisition
- 10 • Fresno Slough Dam: \$51 million
- 11 • Mendota Dam Fish Ladder: \$3.1 million for Ladder 2
- 12 • Extension Levees: \$40.0 million including relocations and levee
- 13 construction
- 14 • Main and Helm Canal Relocations: \$8.9 million
- 15 • Mendota Pool Short Canal and Control Structure: \$13.6 million
- 16 • Mendota Pool Fish Screen: \$41 million
- 17 • Columbia Canal Siphon: \$28 million
- 18 ○ Fresno Slough Dam with an Upstream Diversion Structure: \$259 million
- 19 ▪ San Joaquin River Control Structure and Fish Ladder: \$23.5 million
- 20 • Final Design: \$1.12 million, 5% for design work and data
- 21 collection
- 22 • Construction: \$22.4 million
- 23 ▪ Fresno Slough Dam: \$235.3 million
- 24 • Final Design: \$11.21 million
- 25 • Land Acquisition: \$1.1 million for the concrete lined south canal
- 26 • Fresno Slough Dam: \$51 million
- 27 • Mendota Dam Fish Ladder: \$3.1 million for Ladder 2
- 28 • Extension Levees: \$40.0 million including relocations and levee
- 29 construction
- 30 • Main and Helm Canal Relocations: \$8.9 million
- 31 • Mendota Pool Canal and Control Structure: \$70.04 million based
- 32 on a concrete canal south alignment
- 33 • Mendota Pool Fish Screen: \$22 million

- 1 • Columbia Canal Siphon: \$28 million
- 2 • Arroyo Canal Screening and Sack Dam Passage: \$25 million, based on 30% designs
- 3 • Reach 4B, Eastside Bypass, and Mariposa Bypass: varies based on alternative
- 4 ○ Restore Reach 4B Main Channel to Convey 4,500 cfs: \$123 million
- 5 ▪ Final Design: \$5.85 million
- 6 ▪ Land Acquisition: \$61.95 million based on alignment C
- 7 ▪ Sand Slough Complex: \$5.86 million including the 4B Headgates and
- 8 Sand Slough Control Structure modifications
- 9 ▪ Levee Construction: \$38.81 million including relocations and levee
- 10 construction for Alignment C
- 11 ▪ Road Crossings: \$10.32 million based on Alignment C bridges
- 12 ○ Restore Eastside and Mariposa Bypasses with Levee Improvements and Potential
- 13 Construct Reach 4B Flood Relief of 475 cfs: \$117 million of Bypass
- 14 Modifications, \$31 million of Reach 4B modifications, and \$37 million of levee
- 15 stability
- 16 ▪ Final Design: \$7.02 million
- 17 ▪ Land Acquisition in the Eastside Bypass: \$13.09 million (average of
- 18 \$11.91 million to \$14.27 million) for levee setbacks alignment NW and
- 19 NE in the Eastside Bypass.
- 20 ▪ Sand Slough Complex: \$1.82 million including the 4B Headgates and
- 21 Sand Slough Control Structure modifications
- 22 ▪ Levee Construction: \$67.3 million (average of \$36 million to \$98.6
- 23 million) for levee setbacks in the Eastside Bypass
- 24 ▪ Eastside and Mariposa Bypasses Low-Flow Channel: \$29 million and will
- 25 require modifications to control structures to sustain sediment continuity.
- 26 ▪ Land Acquisition in Reach 4B: assume no acquisition in Reach 4B (state
- 27 ownership) or up to \$12.65 million for levee setbacks alignment Option A
- 28 ▪ Reach 4B Low-Flow Excavation: \$13.5 million, potentially not required
- 29 as part of the core program
- 30 ▪ Reach 4B Road Crossings: \$2.97 million for partially buried box culverts
- 31 based on Alignment A
- 32 ▪ Levee Stability: \$36.96 million (half of the DWR estimate of \$73.93
- 33 million at 3,500 cfs) for levee stability on unmodified levees.
- 34 ○ Bypass Pulse Flows, Restore Reach 4B for Low-Flows of 475 cfs (2,000 cfs
- 35 Conveyance Capacity): \$104 million for Reach 4B and \$74 million in the
- 36 Eastside Bypass
- 37 ▪ Final Design: \$6.56 million

- 1 ▪ Land Acquisition: \$12.65 million based on alignment A
- 2 ▪ Sand Slough Complex: \$4.08 million including the 4B Headgates and
- 3 Sand Slough Control Structure modifications
- 4 ▪ Reach 4B Low-Flow Excavation: \$13.5 million
- 5 ▪ Reach 4B Levee Construction: \$64.52 million including relocations and
- 6 levee construction for Alignment A
- 7 ▪ Reach 4B Road Crossings: \$2.97 million for partially buried box culverts
- 8 based on Alignment A
- 9 ▪ Eastside Bypass Levee Construction: \$73.93 million based on DWR levee
- 10 stability analysis at 3,500 cfs
- 11 ○ Bypass Pulse Flows and Restore Reach 4B for 1,500 cfs: \$109 million for Reach
- 12 4B and \$55.11 million for the Bypasses
- 13 ▪ Final Design: \$5.18 million
- 14 ▪ Land Acquisition: \$12.65 million based on Alignment A
- 15 ▪ Sand Slough Complex: \$9.15 million including the 4B Headgates and
- 16 Sand Slough Control Structure modifications
- 17 ▪ Reach 4B Low-Flow Excavation: \$13.5 million
- 18 ▪ Reach 4B Levee Construction: \$64.52 million including relocations and
- 19 levee construction for Alignment A
- 20 ▪ Reach 4B Road Crossings: \$3.78 million for partially buried box culverts
- 21 based on Alignment A
- 22 ▪ Eastside Bypass Levee Construction: \$55.11 million based on DWR levee
- 23 stability analysis at 2,500 cfs
- 24 • Eastside Bypass Control Structure: \$5 million, assumes selection of a fish way type
- 25 structure
- 26 ○ Final Design: \$0.22 million
- 27 ○ Construction: \$4.34 million
- 28 • Mariposa Bypass Control Structure: \$7 million, may include notching for low-flow
- 29 channel excavation
- 30 ○ Final Design: \$0.31 to \$0.32 million
- 31 ○ Construction: \$6.25 to \$6.49 million
- 32 • Mariposa Bypass Drop Structure: \$2 million, may include removal and low-flow channel
- 33 excavation
- 34 ○ Final Design: \$0.11 million
- 35 ○ Construction: \$2.17 million

1 Costs for Reach 4B, Eastside Bypass, and Mariposa Bypass Conveyance assume that the
 2 modifications to the Mariposa Bypass Control Structure and Drop Structure would occur
 3 consistent with the high flow decision and will not change substantially with alternative
 4 approaches. Long-term use of the bypass for the SJRRP may require land acquisition, which is
 5 not included. Costs for the bypass route assume exclusive use of the Eastside Bypass for routing
 6 of flows and that the Mariposa Bypass and Reach 4B2 would be comparable.

7 **4.4 Uncertainties and Possible Future Changes**

8 The following uncertainties and possible future changes exist:

- 9 • Construction schedules do not consider the availability of construction crews for
 10 mobilization to the area. Availability of construction crews may increase costs or delay
 11 schedules.
- 12 • Costs do not incorporate the additional staging and access requirements for the
 13 mobilization of additional crews to accelerate construction.
- 14 • Costs do not include construction of low-flow crossings or severance for private road
 15 crossings in the Eastside and Mariposa Bypass channels.
- 16 • Reclamation typically uses appraisal level estimates to compare options and does not
 17 generally consider appraisal level estimates adequate for requesting project funding. A
 18 more typical project would develop feasibility-level cost estimates prior to final design.
 19 Some feasibility-level design work will be required to initiate data collection.
- 20 • Reclamation uses a Final Design Process to identify the specific type, location, and
 21 characteristics of structures or channel modifications within the bounds of impacts and
 22 performance set by the site-specific environmental documents. During the Final Design
 23 Process, the Agencies will perform value engineering studies to explore ways to improve
 24 performance and reduce costs.
- 25 • Estimates represent the costs for a federal project. Implementation will seek to take
 26 advantage of local knowledge and partnerships to reduce costs and provide additional
 27 efficiencies.

28 The primary differences between program costs in the site-specific alternatives depend upon the
 29 following:

- 30 • Land Acquisition: the amount of land acquired for the purpose of creating sufficient
 31 floodplain rearing habitat to support the long-term population under the Restoration Goal.
- 32 • Vegetation Planting: the intensity of vegetation planting, level of risk for establishment,
 33 and allowable timeframe to establish vegetation will change the cost per acre of
 34 floodplain habitat by at least one order of magnitude.
- 35 • Passage Criteria at Structures: the selection and design of structures to meet criteria for
 36 transportation and species or lifestage of fish substantially changes costs due to the
 37 number of structures. Specific factors that increase costs include:
 - 38 ○ Raised versus Inundated “Roadways” (eliminates low-cost low-water crossings)

- 1 ○ Flood Routing versus Restoration Only Routing (changes the timeframe when
2 barriers exist at existing structures and the need to address those barriers)
- 3 ○ Elimination of Upstream Backwater Conditions (increases the number of entrance
4 gates, requiring larger or more complicated structures)
- 5 ○ Meeting Sturgeon Criteria on Ladders (requires ramp-type structures for fish
6 passage only)
- 7 ○ Meeting Juvenile Salmon Upstream Passage Criteria on Ladders (requires larger
8 structure sizes to meet criteria)
- 9 ○ Upstream and downstream passage of other native fishes (ie, non-jumping
10 species, lamprey, etc.)

11 Uncertainty in identifying actions as core, secondary, or improvements included:

- 12 • Actions implemented may change in the future, as additional information is available to
13 prioritize actions.
- 14 • The amount of water coming out of Salt and Mud sloughs during migrations periods is
15 sometimes greater than Restoration Flows, which is very likely to attract upmigrating
16 adults into a maze of canals, resulting either in death or significant migration delay.
- 17 • A fish screen on the diversions to Mendota Pool may not be required. Estimates of
18 expected deliveries to Mendota Pool from the San Joaquin River anticipate that juvenile
19 fish will be entrained proportional to diversion rates during the migration time frame. The
20 Settling Parties have asked us to reconsider the need for a screen. The Agencies believe a
21 screen to be a necessary as part of the core program, but will evaluate the frequency and
22 site-specific conditions of water deliveries to Mendota Pool to reconsider the need for a
23 screen.
- 24 • Fish habitat: alternative selection involves additional analysis to determine the amount
25 and type (migration corridor, holding, and rearing habitat) of fish habitat required in each
26 reach to meet restoration goals. Additionally, temperature and primary productivity
27 analyses will allow better assessment of the trade-offs among habitat quality (and
28 therefore fish survival), conveyance capacity, and cost of the selected alternative.
- 29 • Kings River connectivity and salmonid migration: In high water years, flows from the
30 Kings River connect with the Restoration Area and may create conditions that will attract
31 salmonids away from the San Joaquin River. Flow routing in high water years needs to
32 be advantageous to fish, as these are important salmon production years and may be
33 critical determinants as to whether or not the population goals can be met. It is not yet
34 determined whether the 10(J) designation will include the Kings River. These
35 uncertainties could dictate whether or not the King's River Barrier would be a core action
36 and could potential increase costs by \$50 million.
- 37 • How much time will be needed for stock collection of spring-run Chinook salmon to
38 support reintroduction?
- 39 • Uncertainty about how fall-run Chinook salmon will be introduced and how intensive
40 their management will be.

- 1
 - Expense and length of time that trap and haul efforts are necessary.

5.0 Restoration Flow Releases

Restoration Flow actions include releasing, conveying, and monitoring Interim and Restoration flow releases from Friant Dam. The *PEIS/R* provides environmental compliance for the release of Interim and Restoration flows and support for a long-term change in Reclamation's water rights at Friant Dam consistent with the Settlement and the Settlement Act. Under the *Draft PEIS/R*, Reclamation analyzed limiting flows to then-existing channel capacities defined by non-damaging flow rates for both groundwater seepage and levee stability criteria. Completion of seepage management and levee stability projects will increase channel capacity over time and allow for increased release of Interim and Restoration flows.

This section identifies the measures in the *Draft PEIS/R*, monitoring actions for Interim and Restoration flows, and projects that need to be completed in order to convey Interim and Restoration flows. The site-specific project actions address long-term solutions for Reach 2B, Reach 4B, Eastside Bypass, and Mariposa Bypass, but this section also includes information on seepage and levee work in Reach 2B and the Eastside-Bypass to address potential interests in temporary measures.

Conveyance of 2,000 cfs throughout the system will allow continuity of flows for fish passage, provide temperature management ability, and allow floodplain inundation. Seepage and levee actions to achieve 2,000 cfs are part of the core program. Increasing conveyance beyond 2,000 cfs will allow for inundating a larger amount of floodplain habitat for juvenile salmon rearing and a higher pulse releases for juvenile salmon emigration.

5.1 PEIS/R Avoidance, Minimization, and Mitigation Measures and Program Biological Assessment Consultation

The *Draft PEIS/R* includes mitigation measures to reduce impacts from the release of Interim and Restoration flows to less than significant levels. Reclamation released the Public Draft in April 2011 and closed the comment period in September 2011. A *Final PEIS/R* and *Record of Decision* are scheduled for June and July 2012, respectively.

Reclamation and DWR developed a Conservation Strategy in coordination with the Service, NMFS, DWR, and DFG. This strategy is a tool built into the *Draft PEIS/R* and the *Program Biological Assessment* (BA) to minimize and avoid potential impacts on sensitive species and habitats. The Conservation Strategy is not considered mitigation, but rather a plan to implement conservation goals and protective measures for species and communities (such as avoidance, minimization, monitoring, and management measures) consistent with adopted recovery plans.

5.1.1 Actions

Actions under the *PEIS/R* and *BA* to avoid, minimize, or mitigate the impacts from the increased release of Interim and Restoration flows include:

- 1 • Millerton Lake Boat Ramps: monitoring of Millerton Lake pool elevations. If pool
2 elevations fall below the toe elevations of the two lowest-reaching boat ramps,
3 Reclamation will extend the existing ramp, develop a new ramp, or provide temporary
4 access to avoid loss of boat launching capacity.
- 5 • Conservation Strategy: monitoring, reconnaissance-level surveys, comprehensive
6 surveys, and employing methods for avoidance and minimization of impacts on sensitive
7 Federal and State listed species or habitats, including those covered under the Migratory
8 Bird Treaty Act and the Magnuson-Stevens Fishery Conservation and Management Act.
- 9 • Invasive Species Control: Implementation of the *SJRRP Invasive Vegetation and*
10 *Monitoring Management Plan* (Appendix L of the *Draft PEIS/R*) to monitor, control, and
11 where possible, eradicate, invasive plant infestations during flow releases and
12 construction activities.
- 13 • Channel Capacity Advisory Group: an independent review of then-existing channel
14 capacities in accordance with U.S. Army Corps of Engineers (USACE) levee
15 performance criteria comprised of one member each from Reclamation, DWR, USACE,
16 the Lower San Joaquin Levee District, and the Central Valley Flood Protection Board.
- 17 • Endangered Species Act Consultation on Increased Flows: to address Interim and
18 Restoration flow increases up to 4,500 cfs from Friant Dam, Reclamation would present
19 the effects to species under the Service or NMFS jurisdiction related to those flow
20 increases, and request consultation, as deemed appropriate by Reclamation, the Service,
21 and NMFS. This consultation would occur as changes are made that may result in effects
22 to species that have not been previously analyzed.
- 23 • Programmatic Cultural Resources Compliance: For the recovery of cultural resources on
24 lands under federal jurisdiction, there is a requirement to curate archaeological
25 collections and associated records in a facility meeting federal requirements. Curation
26 must be done in accordance with the 43 CFR §79 regulations manual, *Curation of*
27 *Federally Owned and Administered Archaeological Collections*, and the *Departmental of*
28 *the Interior Manual 411*. A Programmatic Agreement is currently being developed in
29 coordination with involved parties, including the California State Historic Preservation
30 Officer. The agreement will further stipulate cultural resources identification efforts and
31 curation responsibilities.

32 The Agencies consider these core actions due to the need to release Interim and Restoration
33 flows.

34 **5.1.2 Schedule**

35 Invasive species control and the Channel Capacity Advisory Group represent ongoing SJRRP
36 activities (Activities of the Channel Capacity Advisory Group will be initiated soon).
37 Consultation of the release of Interim and Restoration flows at rates higher than 1,660 cfs from
38 Friant Dam will be initiated with the on-going Program Biological Assessment effort.
39 Consultation on increased flows will occur in five increments upon completion of the following:
40 Mendota Pool Bypass; Reach 2B conveyance improvements; 3,000 cfs channel capacity below
41 Mendota Dam including seepage, levee, and site-specific projects; 4,000 cfs channel capacity
42 below Mendota Dam including seepage, levee, and site-specific projects; and 4,500 cfs channel

1 capacity below Mendota Dam, or as required by the potential reinitiation triggers in the Section 7
2 consultations.

3 **5.1.3 Costs**

4 Costs provide for implementation of actions from FY 2012 to FY 2026. The Options Appendix
5 lists actions and sources of information for cost estimates. Reclamation assumes an annual need
6 for the Channel Capacity Advisory Group until 2026. The schedule for consultations on
7 increased flows is described above. Table 4 shows *PEIS/R* costs.

8 **Table 4 – Estimated Mitigation and Conservation Strategy Costs**

Measure	Cost (millions)
Millerton Lake Boat Ramps	\$0.21
Conservation Strategy	\$10
Invasive Species Control	\$13
Channel Capacity Advisory Group	\$4
Consultation on Increased Flows	\$7.5
Programmatic Cultural Resources	\$1.5

9 **5.1.4 Uncertainties and Possible Future Changes**

10 Uncertainties and possible future changes in the PEIS/R Avoidance, Minimization, and
11 Mitigation Measures and Program Endangered Species Act (ESA) Consultation include the
12 following:

- 13 • Costs to manage invasive species may be reduced over time, upon establishment of native
14 plant communities.
- 15 • As agencies and stakeholders become accustomed to the return of flows, the level of
16 effort involved in the Channel Capacity Advisory Group may reduce.
- 17 • Regulatory agencies may identify methods to anticipate future effects and consolidate the
18 number of times the SJRRP must consult on increased Interim and Restoration flow
19 releases under the ESA consistent with Exhibit B and the Settlement.
- 20 • Consultation on increased Interim and Restoration flow releases may result in additional
21 requirements and commitments before Reclamation can increase the non-damaging
22 conveyance capacity. These additional requirements and commitments may increase
23 costs and require additional time.

24 **5.2 Flow Management and Monitoring of Physical and Biological** 25 **Processes**

26 Flow management and monitoring of physical and biological processes includes requirements for
27 operations at Friant Dam, compliance with the hydrographs, recapture accounting, PEIS/R
28 commitments, and information to prioritize future actions. Reclamation currently implements
29 these actions through the program of Interim Flows, development of the *Restoration Flow*
30 *Guidelines*, the *Monitoring and Analysis Plan* and *Annual Technical Report* process, and
31 fisheries reintroduction studies.

1 **5.2.1 Actions**

2 Flow management includes the actions under paragraph 13 of the Settlement to monitor flows
3 and acquire, bank, store, or sell water. Monitoring actions span different levels of data collection
4 and analysis, as described within the Options Appendix. Options include:

- 5 • Stream Gage: monitoring the releases from Friant Dam and the locations specified in
6 Exhibit B of the Settlement.
- 7 • Acquire Water for Unexpected Seepage Losses: acquisition of water or options on water
8 to meet the flow targets consistent with the Restoration Flow Guidelines and Paragraph
9 13(c) of the Settlement.
- 10 • Bank or Store Unreleased Restoration Flows: use of water not released for any reason
11 consistent with the *Restoration Flow Guidelines* and Paragraph 13(i) of the Settlement.
- 12 • Monitor Physical and Biological Processes: data collection on terrain, sediment,
13 vegetation, groundwater, temperature, water quality, fisheries, studies, and reporting
14 consistent with the *Monitoring and Analysis Plan* and *Annual Technical Report* (MAP
15 and ATR).
- 16 • Cold Water Pool Management (Friant Dam): consideration of actions to release flows
17 from higher in the water column. This action was identified as a potential improvement
18 for consideration at a later date.

19 The Agencies included stream gaging as a core activity to understand river conditions. They did
20 not identify a fisheries need to acquire water for unexpected seepage losses nor bank or store
21 unreleased Restoration Flows but included both actions to meet the terms of the Settlement. The
22 level of monitoring and analysis for physical and biological processes meets environmental
23 compliance requirements under the *PEIS/R* and is anticipated to fully fund efforts to address
24 uncertainty and guide the implementation of secondary and improvement level projects. A robust
25 monitoring and analysis effort allows program staff to understand the current conditions within
26 in the Restoration Area and to update their understanding, as projects are completed. Future
27 decisions on program implementation will require this monitoring information in order to set
28 priorities for actions identified as secondary. The Agencies will set priorities for monitoring as
29 part of the ATR and MAP process.

30 **5.2.2 Schedule**

31 Each of the flow management actions represents ongoing annual activities. The MAP would
32 identify annual monitoring actions, and activities may change from year-to-year as the program
33 staff learns more about the restored river and addresses critical information needs.

34 **5.2.3 Costs**

35 Costs provide for implementation of actions from FY 2012 to FY 2026. A one-time expense to
36 develop strategies for 13(c) and 13(i) will facilitate those flow management actions.

37 **Table 5 – Estimated Flow Management and Monitoring Costs**

Action	Cost (millions)
Stream Gaging	\$2.6

13(c) and 13(i)	\$1.5
Physical and Biological Monitoring	\$40.95

1 The level of stream gaging relies upon telemetered stage records with periodic calibration, rather
 2 than extensive manual flow measurements. After an initial scoping effort, the implementation of
 3 13(c) and 13(i) will seek to provide cost neutral solutions through ratios on exchanges.

4 **5.2.4 Uncertainties and Possible Future Changes**

5 Uncertainties and possible future changes in Flow Actions include the following:

- 6 • The physical and biological monitoring costs will vary year-to-year depending upon
 7 opportunities provided by hydrology and the need to develop projects.
- 8 • Estimated costs will likely occur primarily in the early years and decrease over time as
 9 the SJRRP addresses uncertainties and reduces the need for studies upon implementation
 10 of projects.
- 11 • While Reclamation can develop cost-neutral banking, storing, exchange, transfer, and
 12 sale on water and options for specific quantities, the ability to reach the quantities called
 13 for in the Settlement is unknown.

14 **5.3 Seepage Management**

15 In the *PEIS/R* the SJRRP commits to limiting flow releases that are within then-existing channel
 16 capacities. Reclamation developed a *Seepage Management Plan* (updated in 2011) in
 17 coordination with the landowners. It lays out a groundwater monitoring network and identifies
 18 thresholds in wells within the monitoring network. Reclamation limits the release of Interim
 19 Flows to flow rates that do not cause groundwater levels to rise above thresholds. Reclamation
 20 can sometimes recapture a portion of the releases from Friant Dam to reduce or avoid
 21 downstream impacts from groundwater seepage. Channel capacities must meet the most
 22 restrictive of seepage constraints and levee constraints. As of the time of this Framework seepage
 23 constraints would limit flows upstream of Mendota Pool to 2,100 cfs in Reach 2A. Seepage
 24 constraints vary by season and by hydrology below Sack Dam. The constraints limit flows
 25 between 0 and 140 cfs in the Eastside Bypass, between Sand Slough Control Structure and the
 26 Mariposa Bypass Bifurcation Structure.

27 In the *PEIS/R*, the SJRRP also commits to addressing seepage effects through easements or
 28 compensation to landowners. Implementation of physical or real-estate related seepage projects
 29 will allow higher flow rates without groundwater levels rising above thresholds. Reclamation, in
 30 coordination with the landowners, has nearly completed development of a *Seepage Project*
 31 *Handbook*, which specifies the process for working with landowners and shows the timelines for
 32 implementing seepage projects. Reclamation has initiated several seepage projects to increase the
 33 non-damaging conveyance capacity for the conveyance of Interim and Restoration flows.

34 **5.3.1 Actions**

35 Seepage projects may include physical projects, such as interceptor lines, drainage ditches, slurry
 36 walls, shallow groundwater pumping, or raising the ground surface. They may also be real estate
 37 actions, such as license agreements, easements, or acquisition. The program staff would

1 coordinate with the landowners to select the specific project for each location. Table 6 shows the
2 acres that may need seepage projects at different flow rates. The Agencies identified channel
3 capacity projects to convey 2,000 cfs of Restoration Flows as part of the core program.

4 **Table 6: Estimated Incremental Area Protected in acres by Seepage Projects**

Flow (cfs)	Reach 2A	Reach 2B	Reach 3	Reach 4A	ESB	Incremental Total	Cumulative Total
300	0	0	0	510	2,370	2,880	2,880
700	0	0	0	2,493	0	2,493	5,373
1,300	0	194	2,548	0	0	2,742	8,115
2,000	0	388	1,097	234	0	1,719	9,834
2,500	1,200	0	1,075	3478	0	5,753	15,587
3,000	0	0	3,634	351	0	3,985	19,572
3,500	0	0	4,519	1,423	0	5,942	25,514
4,000	0	0	1,286	1,498	0	2,784	28,298
4,500	0	0	708	590	0	12,98	29,596
Total	1,200	582	14,867	10,577	2,370	29,596	

5
6 The acreages for Reach 2B and the Eastside Bypass provide information for a short-term action,
7 where the Agencies can provide for seepage protection prior to, or concurrent with, the
8 construction of the site-specific projects. Achieving the listed flow rates will also require
9 satisfying levee stability criteria. Achieving flow rates greater than 1,300 cfs requires site-
10 specific actions under the Mendota Pool Bypass and Reach 2B Channel Improvement Project.

11 5.3.2 Schedule

12 The *Seepage Project Handbook* explains that it will take approximately 10 months from project
13 initiation to completion of analysis and selection of an alternatives; add an additional three
14 months for real estate and contracting actions for construction. The Conveyance Appendix
15 provides the estimated timeline for implementing a seepage project consistent with the *Seepage*
16 *Project Handbook*. A construction action can require an additional one or two years. Assuming
17 implementation by local water agencies, Reclamation and the districts could likely manage 6 to
18 10 individual seepage projects at a time. Assuming a staggered start to the projects, Table 7
19 shows the potential schedule. The Agencies identified channel capacity projects to increase flows
20 to 2,000 cfs as part of the core program. The Agencies identified increasing flows to higher rates
21 as secondary or improvement actions.

22
23 **Table 7 – Potential Seepage Management Schedule with Incremental Number of Projects**

Flow Rate (cfs)	Number of Projects	Duration	Completion Year
300	3	1	2013
700	1	2	2015
1,300	7	2	2015
2,000	12	2	2016

3,000	36	3	2019
4,000	26	3	2022
4,500	8	1	2023

1

2 5.3.3 Costs

3 Site-specific coordination with the landowners will determine the actual project. Acquisition
4 costs were assumed to be representative of likely costs for seepage projects located between
5 canals adjacent to the river, e.g. Poso, Riverside, and Columbia Canals. For all other areas, costs
6 were based on estimated costs for interceptor lines or easements. For properties that overlap with
7 other projects, such as levee stability projects (the Mendota Pool Bypass and Reach 2B Channel
8 Improvements project area, the Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and
9 Structural Improvements project area), costs were estimated based on 5 or 10 year rental costs.
10 These rental costs would allow a short-term increase in flows until the longer-term project can be
11 completed. Likely costs for each project were then summed for reaching flow levels shown in
12 Table 8 below.

13

Table 8: Estimated Incremental Seepage Construction Costs

Flow (cfs)	Reach 2A	Reach 2B	Reach 3	Reach 4A	ESB	Incremental Total	Cumulative Total
300	0	0	0	\$922,000	\$6,041,300	\$6,963,300	\$6,963,300
700	0	0	0	\$918,900	0	\$918,900	\$7,882,200
1300	0	\$816,000	\$7,321,400	0	0	\$8,137,400	\$16,019,600
2,000	0	\$1,979,400	\$4,256,400	\$718,700	0	\$6,954,500	\$22,974,100
2,500	\$993,100	0	\$3,320,500	\$2,020,100	0	\$6,333,700	\$29,307,800
3,000	0	0	\$6,430,800	\$892,900	0	\$7,323,700	\$36,631,500
3,500	0	0	\$5,735,400	\$1,397,600	0	\$7,133,000	\$43,764,500
4,000	0	0	\$1,981,700	\$3,041,300	0	\$5,023,000	\$48,787,500
4,500	0	0	\$1,614,200	\$688,600	0	\$2,302,800	\$51,090,300
Total	\$993,100	\$2,795,400	\$30,660,400	\$10,600,100	\$6,041,300	\$51,090,300	

14

15 Seepage project costs by project are available in the Conveyance Appendix along with
16 supporting information for a range of projects. Costs to convey 4,500 cfs range from \$35 million
17 with exclusive implementation of interceptor lines to \$120 million with exclusive
18 implementation of easements.

19 Annual operations and maintenance cost are estimated to be \$3.05 million per year upon
20 completion of likely seepage projects to enable flows up to 4,500 cfs.

21 5.3.4 Uncertainties and Possible Future Changes

22 Parcel groups within approximately one mile of the river were used for this analysis. Additional
23 analysis and groundwater modeling provided by the U.S. Geological Survey (USGS) could
24 change the extent of needed projects. Site-specific conditions are currently unknown. The extent
25 of impact on a specific parcel could increase or decrease and change the type of project. While
26 many of the landowners attend seepage technical feedback meetings and support site-specific

1 studies, participation is not universal. Landowners unwilling to participate in the activities may
2 extend the schedule. Reclamation assumed permanent easements cost 50% of estimated fee title.
3 Site-specific analysis and appraisals could change land value and project costs. Opportunities for
4 landowners to participate in cost-share agreements where seepage projects improve groundwater
5 conditions outside of Restoration Flows may reduce operations and maintenance costs.

6 **5.4 Levee Stability**

7 The *PEIS/R* limits Restoration Flows to then-existing channel capacity based on USACE criteria
8 for levee through- and under-seepage. Determining levee stability risks requires data collection
9 on levee materials. In the absence of sufficient data to evaluate levee stability, Reclamation has
10 committed to maintaining flows below the outside toe. Levee constraints currently limit flows:

- 11 • Upstream of Mendota Pool to 810 cfs in Reach 2B; and
- 12 • Below Sack Dam to 600 cfs in the Eastside Bypass.

13 DWR is working on a geotechnical investigation to collect the relevant data to identify and
14 prioritize bottleneck areas for levee remediation. The following section describes the potential
15 costs of levee remediation to reduce potential flood impacts based on then-existing flow
16 capacities and river lengths that were included in the *PEIS/R* to show levees potentially impacted
17 by Restoration Flows. The estimates assume either toe drain or slurry walls for locations where
18 water surfaces exceeded the levee toe as representative projects to provide bookends for the
19 range of costs.

20 **5.4.1 Actions**

21 The analysis assumed that any flow above the levee toe could have an impact on levee stability.
22 Table 9 shows potential levee remediation lengths at various flow levels. Table 9 assumes that a
23 site-specific project would address Reach 2B levee repairs, and thus Mendota Pool levee costs
24 are not included. The Conveyance Appendix includes costs for all of Reach 2B. Table 10 shows
25 the Reach 2B (upstream of Mendota Pool) and Eastside Bypass potential levee remediation
26 lengths without the implementation of the site-specific project costs. The Agencies identified
27 channel capacity projects to increase flows to 2,000 cfs as part of the core program. The
28 Agencies identified increasing flows to higher rates as secondary or improvement actions.

29 **Table 9: Estimated Incremental Levee Repair Lengths in miles assuming no flows above the levee toe until a project is**
30 **implemented**

Flow (cfs)	Reach 2A	Reach 3	Reach 4A	Reach 5	Incremental Total	Cumulative Total
700	0.0	0.0	0.0	0.0	0.0	0.0
1,300	0.0	0.4	0.4	0.0	0.7	0.7
2,000	0.2	0.4	1.7	0.0	2.3	3.1
2,500	0.2	1.0	1.0	0.5	2.6	5.7
3,000	1.1	0.7	1.1	0.8	3.6	9.4
3,500	1.3	2.8	1.8	0.6	6.6	15.9
4,000	1.2	7.1	3.7	0.3	12.3	28.2

4,500	0.7	6.5	6.4	0.4	13.9	42.1
Total	4.8	18.8	16.0	2.5	42.1	

1
2

Table 10: Estimated Incremental Levee Repair Lengths in miles for Reach 2B and the Eastside Bypass

Flow (cfs)	Reach 2B	Eastside Bypass	Incremental Total	Cumulative Total
700	0.0	7.5	7.5	7.5
1,300	0.1	2.8	3.0	10.5
2,000	0.9	4.1	5.1	15.5
2,500	6.5	2.6	9.1	24.7
3,000	2.5	2.2	4.8	29.4
3,500	1.4	3.6	5.0	34.4
4,000	0.7	4.4	5.1	39.5
4,500	0.2	3.3	3.5	42.9
Total	12.4	30.6	42.9	

3 5.4.2 Schedule

4 DWR is currently preparing a project management plan to evaluate levee stability using methods
5 consistent with the USACE levee evaluation guidelines to identify where concerns may exist.
6 This plan will involve evaluating existing geometry, levee assessment, and past performance
7 data; conducting a geotechnical drilling program; and performing seepage and stability
8 modeling. Evaluation of the most critical levee sections may take until fall 2013, following
9 which channel capacities may be revised. Concurrently, a programmatic environmental
10 compliance document for a levee repair program will be pursued. This may take 18 months to 2
11 years, following which the evaluation, land acquisition, final design and site-specific
12 environmental documentation can be completed. Progress on levee stability evaluation can
13 proceed on the following schedule.

- 14 • 2014 – Revision of channel capacity constraints following completion of levee evaluation
- 15 • 2015 – Completion of environmental compliance and design
- 16 • 2016 – Initiation of construction activities

17 Upon initiation of construction, Table 11 shows the potential schedule and related conveyance
18 capacity improvements, assuming that Eastside Bypass and Reach 2B levees are fixed as part of
19 this project and not their site-specific projects. In reality, the site-specific projects must be
20 completed to gain any increase in channel capacity, as those reaches are the bottlenecks. The
21 Agencies identified channel capacity projects to increase flows to 2,000 cfs as part of the core
22 program. The agencies may delay projects for higher flows to later dates.

23

Table 11 Potential Levee Stability Schedule

Flow Rate (cfs)	Length (miles)	Duration (years)	Completion Year
700	8	2	2018

1,300	4	1	2018
2,000	7	1	2018
3,000	20	3	2021
4,000	29	4	2025
4,500	17	3	2028

1

2 **5.4.3 Costs**

3 Table 12 below shows estimated levee stability costs based on an assumption that half of the
4 levee lengths needing repairs would require the highest cost solution, slurry wall repairs, and half
5 would require a low-cost solution, such as drains. While neither solution may be implemented,
6 these costs result in a mid-point value useful for planning purposes.

7

Table 12: Estimated Incremental Levee Remediation Costs

Flow (cfs)	Reach 2A	Reach 3	Reach 4A	Reach 5	Incremental Total	Cumulative Total
700	\$0	\$0	\$0	\$0	\$0	\$0
1,300	\$0	\$1,280,000	\$1,133,000	\$0	\$2,413,000	\$2,413,000
2,000	\$764,000	\$1,287,000	\$5,447,000	\$0	\$7,498,000	\$9,911,000
2,500	\$585,000	\$3,141,000	\$3,248,000	\$1,539,000	\$8,513,000	\$18,424,000
3,000	\$3,612,000	\$2,120,000	\$3,477,000	\$2,549,000	\$11,758,000	\$30,182,000
3,500	\$4,326,000	\$9,134,000	\$5,883,000	\$1,800,000	\$21,143,000	\$51,325,000
4,000	\$3,918,000	\$22,771,000	\$12,022,000	\$925,000	\$39,636,000	\$90,961,000
4,500	\$2,270,000	\$20,857,000	\$20,497,000	\$1,138,000	\$44,762,000	\$135,723,000
Total	\$15,475,000	\$60,590,000	\$51,707,000	\$7,951,000	\$135,723,000	

8 Table 13 shows the costs for Reach 2B (upstream of Mendota Pool) and Eastside Bypass levee
9 remediation for an interim action or an alternative to the site-specific projects.

10

Table 13: Reach 2B and Eastside Bypass Estimated Incremental Levee Remediation Costs

Flow (cfs)	Reach 2B	Eastside Bypass	Incremental Total	Cumulative Total
700	\$0	\$24,264,000	\$24,264,000	\$24,264,000
1,300	\$389,000	\$9,129,000	\$9,518,000	\$33,782,000
2,000	\$3,059,000	\$13,279,000	\$16,338,000	\$50,120,000
2,500	\$20,975,000	\$8,434,000	\$29,409,000	\$79,529,000
3,000	\$8,129,000	\$7,223,000	\$15,352,000	\$94,881,000
3,500	\$4,427,000	\$11,597,000	\$16,024,000	\$110,905,000
4,000	\$2,219,000	\$14,118,000	\$16,337,000	\$127,242,000
4,500	\$717,000	\$10,485,000	\$11,202,000	\$138,444,000
Total	\$39,915,000	\$98,529,000	\$138,444,000	

11

12

1 The costs shown in Table 12 above represent a best estimate. DWR developed costs for a range
2 of potential options, as shown in the Conveyance Appendix. At 4,500 cfs, estimates of cost range
3 of \$27 million (with all toe drains) to \$245 million (with all slurry walls), excluding the
4 Reach 2B and Eastside Bypass costs, which will be addressed under the site-specific projects.

5 **5.4.4 Uncertainties and Possible Future Changes**

6 It was assumed that no levee stability problems would occur at the 300 cfs release from Friant
7 Dam. Further analysis is needed in the upper reach of the Eastside Bypass to ensure that this
8 assumption is accurate. It was also assumed that no levee repairs were needed within Mendota
9 Pool, although water reaches the levee toe. If the core action does not include the Mendota Pool
10 Bypass Project, these costs will need to be added in.

11 These results are preliminary, until further information is known about levee conditions,
12 performance during flows, and suitable mitigation measures. The impacts on levees for
13 individual overtopping depth will not be known until more levee data is collected. After
14 evaluation, DWR may find that some flow above the levee toe does not result in levee stability
15 concerns, and costs could decrease.

16 Levee stability concerns at 700 cfs indicate potential for repairs to levees in the Eastside Bypass,
17 and thus the project would need to be coordinated with the Reach 4B, Eastside Bypass, and
18 Mariposa Bypass projects. This would ensure a permanent solution for the Reach 4B Project,
19 while levee stability is developed. This may require the completion of the Reach 4B Project
20 Record of Decision, which could lengthen the schedule.

21

6.0 Fish Reintroduction

The timeline and strategy for reintroduction of Chinook salmon should consider the status of river projects and projected in-stream conditions in the Restoration Area. The Agencies will conduct a series of efforts to further the reintroduction process through developing a captive broodstock, conducting expanded studies to address key uncertainties, and implementing pilot Chinook release efforts to test and refine strategies. Section 5.2 provides for reintroduction monitoring and studies integrated with overall Program monitoring efforts. The SJRRP is committed to maintaining the reintroduction of spring-run Chinook salmon as the priority, but believe both spring-run and fall-run Chinook salmon can be used, as appropriate, to test and refine reintroduction strategies, while also moving the long term program objectives forward. Consistent with the Settlement Act, no spring-run Chinook will be released into the San Joaquin River until the Experimental Population Status and associated rules are in place.

6.1 Actions

Fish reintroduction activities include activities to collect, rear, and release Chinook salmon as follows:

- **Construct a Conservation Hatchery Facility:** Construct and operate the San Joaquin River Salmon Conservation and Research Facility (Conservation Hatchery). The Conservation Hatchery will allow the program to develop brood stock and rear the number of juveniles necessary to restore self-sustaining salmon populations. Without the Conservation Hatchery, the program would have to rely on colonization of the Restoration Area by strays or direct transfers from other watersheds. Passive restoration is unlikely, since no spring-run Chinook populations are established within the San Joaquin Basin, and strays from the Sacramento River will be infrequent and inconsistent.
- **Develop Broodstock:** Develop spring-run Chinook brood stock to provide a source of fish for releases, including the collection and transportation of eggs or fish from various donor stock locations to the Conservation Hatchery.
- **Monitor Source Stocks:** monitor the status of potential donor stocks to determine the suitability for collection and incorporation into broodstock. The *Hatchery and Genetics Management Plan* identifies a multi-stock approach for reintroducing salmon to the San Joaquin River. Existing stocks of spring-run Chinook salmon are depressed and protected under federal and state laws. Collecting from these stocks requires the program to show that such collections would not jeopardize the survival of the existing stocks and would provide a net benefit to the species. Existing monitoring efforts may not be sufficient to determine if collecting from these stocks is appropriate.
- **Fish Releases:** Eggs, juvenile, and adult Chinook salmon will be released in the Restoration Area for studies, under appropriate permits, to complete their lifecycle, and to contribute to future populations.

- Trap and Haul: Both adult and juvenile fish will be moved around passage barriers. Several passage barriers will exist within the system when activities begin. Fish released into the system prior to the passage issues being completely resolved will require assistance to reach suitable rearing, holding, migration, and spawning habitat. Trap and haul operations have been used in other systems to provide salmon passage around impoundments and other barriers to allow fish releases prior to resolving all passage issues.

6.2 Schedule

The reintroduction of Chinook salmon to the Restoration Area will take place over several years and will be an adaptively managed process. The number of fish released and expectations for returns will be phased in and dependent upon the status of channel improvements, regulatory compliance, and the results of ongoing studies. Juvenile fall-run Chinook salmon were released into the system for targeted studies in 2010 and releases continue today. Contingent upon approval and receipt of a Section 10(a)(1)(a) permit, the program will begin developing a spring-run Chinook captive brood stock at the Interim Facility. If an experimental population designation is given to the Restoration Area, study releases of spring-run Chinook salmon would begin in spring 2013. The study would inform the program about the performance of spring-run Chinook salmon in the Restoration Area and provide a proof-of-concept for fish handling, rearing, and release methodologies. A trap and haul program will provide passage for any adult Chinook that return from these releases. We will increase the scale of releases in spring 2016, since we will have produced juvenile fish from our captive brood stock and will have also improved river conditions. Most passage barriers will be resolved by 2017, but the operation of a trap and haul system would continue until all passage barriers are resolved (2020). Table 14 describes major milestones for the reintroduction process, which are contingent on issuance of permits and reintroduction will be in conformance with all permit terms.

Table 14. Timeline of fish reintroduction milestones

Date	Milestones for Fish Reintroduction
Spring 2010	Begin broodstock rearing study
Spring 2011	Begin targeted studies with captive rearing and releases of fall-run Chinook Salmon
August 2012	Expected determination on Section 10(a)(1)(a) Enhancement of Species Permit
Fall 2012	Collect FRFH spring-run Chinook eggs for development of captive brood stock
December 2012	Expected determination of 10(j) experimental population designation and associated 4(d) rules.
Spring 2013	Release up to 54,400 spring-run Chinook juveniles into Restoration Area for expanded studies purposes.
Spring 2015	Operate a trap and haul program to transport any returns from spring-run Chinook salmon releases
Fall 2015	Conservation Facility operational for rearing of Chinook salmon
October 2015	Captive brood stock begins producing offspring for restoration
Spring 2016	Begin full implementation of spring-run Chinook salmon releases for

	restoration.
Spring 2020	All primary passage barriers resolved for adult Chinook salmon. Trap and haul only implemented in response to observed migration delays.

1

2 **Construct Conservation Hatchery Facility**

3 The Conservation Hatchery is currently in the planning and design process. The facility is
 4 expected to be available to rear Chinook salmon by the fall 2015. The program currently has an
 5 operational Interim Facility for rearing Chinook salmon adjacent to the existing San Joaquin Fish
 6 Hatchery. The Interim Facility will be used to rear Chinook salmon for captive broodstock or for
 7 rearing fish to release into the Restoration Area.

8 **6.2.1 Develop Broodstock**

9 Contingent upon regulatory compliance including the approval of an ESA Section 10(a)(1)(A)
 10 permit, the program will proceed with developing a captive broodstock of spring-run Chinook
 11 salmon. The determination on the 10(a)(1)(A) permit application is expected by the end of
 12 summer 2012, and, if approved, the development of a program broodstock is expected to begin
 13 in 2012 from the progeny of fish spawned in fall 2012 at the Feather River Fish Hatchery.
 14 Collections for broodstock will continue in subsequent years, and the number of fish in the
 15 captive broodstock program will increase as additional year classes are added and the capacity
 16 for rearing fish increases through the construction of the Conservation Hatchery. As described in
 17 the *Strategy for Spring Chinook Salmon Reintroduction* (SJRRP 2011), captive broodstock is a
 18 principle component for producing the quantity of eggs and juveniles needed to reintroduce
 19 spring-run Chinook salmon into the Restoration Area (in conjunction with direct translocation of
 20 eggs and juveniles from donor stocks). Although subject to annual review, the SJRRP intends to
 21 collect up to 560 eggs or juveniles for the first three years for use as broodstock. In years four
 22 and later, the program may collect as many as 2,760 eggs or juveniles from the Feather River
 23 Fish Hatchery (FRFH). Eggs from the captive broodstock program should be available in 2015.
 24 The number of eggs available will increase over time, and will reach full capacity when the
 25 program is able to maintain broodstock at the completed Conservation Hatchery.
 26

27 **6.2.2 Source Stock Monitoring**

28 The program will also continue to pursue donor stock collections from extant wild Spring-run
 29 Chinook populations. The program will continue to work with DFG and NMFS to develop
 30 criteria that will allow collection of broodstock from these source stocks. Monitoring these
 31 stocks may become a part of the process, where existing monitoring efforts are not sufficient
 32 inform future collections.
 33

34 **6.2.3 Fish Release**

35 The current status of the system with flows of at least 300 cfs release from Friant Dam can
 36 support Chinook salmon releases subject to certain constraints and expectations. The release
 37 strategies for the near future will continue to focus on progressing toward full restoration of self-
 38 sustaining fish populations. The requested spring-run Chinook take-limit for translocation to the
 39 San Joaquin River from the Feather River Fish Hatchery is 80,000 eggs or the equivalent number

1 of juveniles (54,400). The program proposes to use all of this stock for these releases. This
2 number of eggs or equivalent number of juveniles is not expected to be sufficient to establish a
3 self-sustaining population, but will allow for implementing expanded study efforts and,
4 potentially, result in adult fish returning to the system. These activities will be conducted in
5 concert with a monitoring and evaluation program described in Section 5.2.

6 The study objectives of these releases can be divided between two broad categories as follows:
7 (1) to support studies on Chinook behavior and performance in the system; and (2) to provide a
8 proof-of-concept for fish reintroduction activities. By proceeding with these releases of study
9 fish, the Agencies intend to minimize the delay in meeting the long-term objective of self-
10 sustaining populations by improving the body of knowledge and abilities. At the same time, the
11 Agencies plan to develop Conservation Hatchery production capacity and complete
12 improvements to the river.

13 To better understand Chinook salmon performance and behavior in the system, multiple studies
14 will be conducted in coordination with fish releases. The questions addressed by these studies
15 will be broad and depend on current conditions, but the key objective can be described as
16 increasing the understanding of how fish will survive and behave in the system. A combination
17 of tagging methods, release locations, and field monitoring will be used to address survival,
18 migration rates, migration timing, and habitat use for juvenile and adult fish in the Restoration
19 Area and as they migrate through the Delta.

20 Working with modest numbers of fish will allow the Agencies to work through methods for
21 rearing and releasing juvenile fish and handling adult fish when they return. The Agencies
22 propose to use a variety of rearing and release methods described in the *Reintroduction Strategy*
23 *for Spring-Run Chinook Salmon* (SJRRP 2011), such as streamside rearing, use of net pens, and
24 releasing fish at multiple life stages.

25 Fish releases at this magnitude will continue for the next few years as broodstock capacity grows
26 and channel improvements are made. As flow capacities increase, juvenile salmon survival is
27 expected to increase. As channel improvement projects allow flows of 700 cfs or greater, we
28 expect juvenile migration survival to improve and more juvenile salmon to successfully migrate
29 through the Restoration Area.

30 When channel improvement projects have been completed to allow for a reliable passage
31 corridor for adult Chinook salmon, the program will pursue increased releases of Chinook
32 salmon for reintroduction purposes above the current permit request of 54,400 juveniles from the
33 Feather River Hatchery. In 2015, we expect eggs to start being produced by our captive
34 broodstock; therefore, we will have the capacity to increase our release levels by using locally
35 produced fish. When these fish return as adults to the Restoration Area in 2018, flow conveyance
36 will exceed 2,000 cfs, which will allow for temperature management. All adult migration barriers
37 will be resolved except for Mendota Dam. An intensive trap and haul program will be needed to
38 assist adult migration past Mendota Dam until bypass construction is completed in 2019. From
39 2020 on, we expect juvenile and adult salmon to be able to migrate through the restoration area
40 without assistance.

41 **6.2.4 Trap and Haul**

42 Concurrent with planning fish releases, the program will prepare for any returning adults by
43 setting a trap and haul operation below the lowest adult passage barrier in the system. Trap and

1 Haul programs have been used in other systems to allow fish passage prior to resolving all fish
 2 passage impediments (Zimmerman DATE?). Returning adults would be trapped and transported
 3 to upstream areas or returned to the Conservation Facility to be incorporated into our production
 4 operations. We expect low numbers of adult returns from the initial releases, which will allow us
 5 to actively capture and transport these fish. In fall 2011, we successfully conducted a study on
 6 our ability to collect and transport adult fall-run Chinook and deliver them to a hatchery setting.
 7 We can begin the testing of a trap, haul, and release program prior to the return of released fish,
 8 if we rely on fall-run Chinook salmon from San Joaquin tributaries that stray into the Restoration
 9 Area. In fall 2012, we will conduct a pilot capture, transport, and release of adult fall-run
 10 Chinook into the Restoration Area for biological study purposes as well as to study our ability to
 11 trap, transport, and release adult salmon into the system. Fish may be trapped at the Hills Ferry
 12 Barrier or at a location further upstream. The fish will be acoustically tagged to monitor their
 13 survival and habitat use. As channel improvements are completed, we expect the location of the
 14 fish trap to move further upstream to minimize the length of travel requiring human intervention.
 15 By 2020, all primary passage impediments will be resolved, so we will phase-out the trap and
 16 haul program and allow fish to volitionally migrate to the spawning grounds. The trap and haul
 17 program can be implemented to respond to observations of stranded fish or extreme conditions.

18 The conditions for salmon in the Restoration Area and our understanding of those conditions
 19 may change rapidly based on water year type, completion of projects, and study results. The
 20 *Reintroduction Strategy for Spring-Run Chinook Salmon* and the *Fisheries Management Plan*
 21 acknowledges these potential changes, and outlines an annual process for technical teams to
 22 review current conditions and make recommendations on donor stock collections and release
 23 numbers.

24 6.3 Costs

25 The following costs are estimates for fishery reintroduction activities through 2026.

26

Action	Cost (millions)
Conservation Hatchery Construction	\$14.56
Conservation Hatchery O&M	\$7.0
Monitoring of Source Stock	\$7.80
Collection, Transport and Release of Source Stock	\$8.32
Trap and Haul Program	\$11.26

27 6.4 Uncertainties and Possible Future Changes

28 Several factors influence the ability to conduct fish releases, including: expected river conditions,
 29 regulatory compliance, and addressing program impacts. Resolving these issues will affect
 30 implementation of activities (both schedule and how activities are implemented) and the degree
 31 to which we work with spring-run or fall-run Chinook salmon.

32 A Section 10(a)(1)(A) enhancement of species permit is necessary prior to collecting any spring-
 33 run Chinook or eggs from donor stock, and no spring-run Chinook can be released into the San

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- 1 Joaquin River unless a 10(j) experimental population designation and associated 4(d) rule is
- 2 completed.
- 3 It is expected that a decision on the donor stock collection permit request would be completed by
- 4 August 2012, and the 10(j) experimental population designation and associated 4(d) rule by
- 5 December 2012.
- 6 The specific details and when and how fall-run Chinook are reintroduced are still under
- 7 development.

7.0 Water Management

Water Management Goal actions include the identification, development, and implementation of projects and programs to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement. The reduction in water deliveries caused by the Interim Flows and Restoration Flows is monitored and recorded in the Recovered Water Accounts (RWA).

Although reduction in RWA balances does not necessarily equate to recovery of water supply, the SJRRP will set priority actions and measures success by the reduction of Friant Division long-term contractors RWA balances.

Reclamation, in consultation with the other Settling Parties and coordination with the State of California, is authorized and directed to implement a plan for recirculation, recapture, reuse, exchange or transfer (R&R Plan) of the Interim Flows and Restoration Flows. Since 2008, Reclamation has been working with the Settling Parties to develop and implement the R&R Plan. The *Draft R&R Plan* was completed on February 10, 2011.

Reclamation, in consultation with the other Settling Parties and coordination with the State of California, is authorized and directed to implement a RWA Program, to make water available in wet hydrologic conditions to all of the Friant Division long-term contractors who provide water to meet Interim Flows and Restoration Flows, at a total cost of \$10 per acre foot. The RWA Program is an action that will continue for the entire SJRRP, and which has delivered approximately 324 TAF of water to the Friant Contractors. Since 2008, Reclamation has been working with the Settling Parties to establish a baseline condition as of the effective date of the Settlement with respect to water deliveries for the purpose of determining the reduction in water deliveries.

Reclamation, in coordination with applicable Federal, State, regional, and local authorities, is authorized and directed to conduct feasibility studies on the restoration of the capacity of the Friant-Kern Canal and Madera Canal to such capacity, as previously designed and constructed by Reclamation. Upon completion of and consistent with the applicable feasibility study, Reclamation is authorized to construct the improvements and facilities in accordance with applicable Federal and State laws. Initially, Reclamation evaluated the capacity restoration for the Friant-Kern Canal jointly with the Madera Canal, but because of their unique differences in the design and construction, Reclamation has since separated the evaluations.

Reclamation provided draft guidelines for awarding Financial Assistance for Local Projects in March 2010. Initiation of projects will depend upon a Funding Opportunity Announcement after appropriations.

7.1 Actions

Actions identified by the Implementing Agencies to reduce or avoid adverse water supply impacts include:

- 1 • Recapture and Recirculation: A plan for recirculation, recapture, reuse, exchange or
2 transfer of the Interim Flows and Restoration Flows, including the funding necessary
3 measures to implement the plan. To assist decision makers in identifying the necessary
4 measures and the amount of funding required, Reclamation, in consultation with the
5 Settling Parties, is completing an Investment Strategy to fund projects and programs to
6 reduce or avoid adverse water supply impacts. The Investment Strategy will identify
7 available water resources, formulate alternatives, evaluate the effects of alternatives,
8 compare alternatives, and recommend alternatives for consideration by decision makers.
9 The Agencies identified Recapture and Recirculation as part of the core program with
10 limitations on the available funds, as described under the costs section. Additional funds
11 to improve Recapture and Recirculation or otherwise reduce or avoid adverse water
12 supply impacts would be secondary actions.

- 13 • Recovered Water Account: a program to make water available, in wet hydrologic
14 conditions, to all of the Friant Division long-term contractors who provide water to meet
15 Interim Flows and Restoration Flows, at a total cost of \$10 per acre foot (costs to develop
16 and implement this program are included as part of program staffing). The Agencies
17 identified the RWA as part of the core program.

- 18 • Restoration of the capacity of the Friant-Kern Canal and Madera Canal to such capacity
19 as previously designed and constructed by Reclamation. The restoration of capacity on
20 the Friant-Kern and Madera Canals are part of the core program.

- 21 • Friant-Kern Canal Reverse Flow Pump-Back: As provided in Section 10203(b) of the
22 Act, \$17 million is available for the Friant-Kern Canal Reverse Flow Pump-Back Project
23 (FKC Reverse Pump Project), provided that the project is not already authorized and
24 funded under the R&R Plan, and that such expenditure will not conflict with, or delay
25 implementation of, actions required by part I of the Settlement Act. The caveats
26 identified in the legislation resulted in the Agencies identifying FKC Reverse Pump as a
27 secondary action.

- 28 • Financial Assistance for Local Projects (Part III Projects): Reclamation is authorized to
29 be appropriated \$50 million (October 2008 price levels) to carry out the purposes of Part
30 III of the Act. The Agencies will use the \$50 million in appropriated funds to provide
31 financial assistance for the Part III Projects as part of the core program.

32 **7.2 Schedule**

33 The R&R Plan is an action that will continue for the entire program. The completion date for the
34 Final R&R Plan is currently unknown. Due to the number of issues and uncertainties in the
35 lower San Joaquin River, Sacramento-San Joaquin Delta, and coordination of State Water
36 Project and CVP Facilities, it is anticipated that the Final R&R Plan will be amended and
37 supplemented as needed. The Investment Strategy is scheduled to start in August 2012 and
38 conclude in September 2013.

39 The remaining effort in the RWA is the baseline used to determine reduction in water deliveries.
40 Reclamation anticipates completing the baseline by August 1, 2012.

41 The anticipated schedule for the Friant-Kern Canal Capacity Restoration Project is:

ACTIVITY	START DATE	END DATE
Feasibility Study	March 30, 2009	June 2012
Final Design	April 2012	August 2012
Construction	August 2012	January 2016

The anticipated schedule for the Madera Canal Capacity Restoration Project is:

ACTIVITY	START DATE	END DATE
Feasibility Study	March 30, 2009	June 2013
Demonstration Project	April 2012	June 2013
Final Design	June 2013	January 2014
Construction	January 2014	April 2015

The anticipated schedule for Part III Financial assistance is:

ACTIVITY	DATE
Part III Guidelines	August 2012
FY 2013 Funding	October 2012
FY 2014 Funding	October 2013
FY 2015 Funding	October 2014
FY 2016 Funding	October 2015
FY 2017 Funding	October 2016
FY 2018 Funding	October 2017
FY 2019 Funding	October 2018

7.3 Costs

The following costs are estimates for the Water Management Goal actions through December 31, 2025:

Action	Total Cost
Recapture and Recirculation	\$15 million
Recovered Water Account and Program	N/A (Program Staff)
Friant-Kern Canal and Madera Canal Capacity Restoration Project	\$35 million
Friant-Kern Canal Reverse Flow Pump-Back	\$17 million
Part III Projects (October 2008 price levels)	\$50 million

A component of the R&R Plan is to include provisions for funding necessary measures to implement the R&R Plan. While neither the Settlement nor Settlement Act authorizes a specific amount to be made available, the R&R Plan is an action required by Section 10004(a)(4), Part I

1 of the Act. The Agencies identified \$5 million to complete an Investment Strategy that will guide
2 implementation of core and secondary projects, and \$10 million for funding necessary measures
3 to implement the R&R Plan as part of the core program, which may include the FKC Reverse
4 Pump Project or other conveyance or pumping facilities.

5 **7.4 Uncertainties and Possible Future Changes**

6 Reclamation will work with DWR and State and Federal Contractors to develop the recapture
7 and recirculation plan. Uncertainties in the conditions of the Delta and lower San Joaquin River
8 may limit opportunities to recapture water. The Water Management Goal may shift focus to
9 increase the use of wet-year water supplies. The Investment Strategy will help determine the
10 projects to undertake.

1 **8.0 References**

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