SAN JOAQUIN RIVER RESTORATION PROGRAM

RESTORATION ADMINISTRATOR

2017 ANNUAL REPORT

September 2018

1 Introduction & Context

This Annual Report on the status of the San Joaquin River Restoration Program (SJRRP or Program) is prepared in accordance with the Stipulation of Settlement filed September 13, 2006 in the case of NRDC, et al., v. Kirk Rodgers, et al. Pursuant to the Stipulation of Settlement (Settlement), the annual report shall include a summary of settlement implementation activities of the previous year, findings of research and data collection, any additional recommended measures to achieve the Restoration Goal, a summary of progress and impediments in meeting targets established pursuant to Settlement Paragraph 11 (Paragraph 11), and a summary of expenditures from the Restoration Administrator (RA) Account.

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2 Overview of 2017

The winter and spring of 2017 – January through June- had the highest unimpaired runoff in the historic record. Runoff in the 2017 water year, which began in October 2016, started above average and became dramatically higher in January with warm storms; ultimately the total unimpaired runoff in the 2016-17 Water Year was nearly 4,400 TAF (thousand acre-feet), second highest in the historic record. It was classified in the Settlement as a Wet Year (runoff greater than 2,500 TAF is classified as Wet). Flood control releases from Friant Dam commenced in mid-January, and continued until July 21. Despite the high flows down the river and flood control channels, this wet year produced substantial Unreleased Restoration Flows (URF's) due to seepage limitations that would apply to Restoration Flows but not to flood control releases. Had there been no flood control releases, river flows would have been limited to about 170 cubic feet per second (cfs) below Sack Dam (limits are adjusted through time based on field conditions); instead, the same reach experienced flood control flows in excess of 4,000 cfs. All Restoration Flows above the seepage threshold at Sack Dam were designated URF's and sold for the benefit of the Program.

Coordination of Restoration Flows with the flood control releases and monitoring of flood control operations to avoid potential adverse biological consequences to the extent possible were key elements of Restoration Flow planning and operations for 2017. River stage and routing at various locations, Friant Dam release temperature, and seepage levels were all key data to be monitored in light of Restoration Program goals.

A significant Program effort was the tagging and release of 130 adult spring-run Chinook salmon in Reach 1A of the San Joaquin River downstream of Friant Dam. Among other information, data was collected on holding patterns in the river and locations of successful redd construction. Monitoring efforts of juveniles hatched from those redds continued in winter and spring of 2018. Data is still being analyzed, but this effort will provide significant insights as to the potential for spring-run spawning success in the San Joaquin River.

In the fall of 2016, the San Joaquin River was hydrologically connected by Restoration Flows from Friant Dam to the Delta, for the first time since 2011. Although the river had been connected with Interim Flows in 2010 and 2011, connected with flood control releases in 2011, and partially connected (from Friant Dam to Mendota Pool) with Interim Flows in 2012 and 2013, the full connectivity with Restoration Flows marked a significant milestone in Settlement implementation. Connectivity with Restoration Flows from Friant Dam to the Merced River confluence was maintained for the entirety of 2017.

3 Assessment of SJRRP Progress during 2017

This Section provides an overview of specific milestones and accomplishments, progress towards meeting Paragraph 11, 13 and 14 requirements, and overall program challenges.

Specific Milestones and Accomplishments during 2017

Some of the key Program milestones and accomplishments for 2017 include:

- Leading up to Restoration Year 2017, the San Joaquin River was fully connected in mid-October 2016, near the beginning of the 2017 Water Year, with Restoration Flows from Friant Dam to the Merced River confluence. Although Restoration Flows formally commenced in 2014, because of the dry conditions in 2014 no Restoration Flows were released beyond February 2014 and in 2015, per the settlement, no Restoration Flows were allocated or released. Restoration Flows were released consistently through 2016 beginning in late March, but downstream operational and seepage constraints prevented hydrologic connection until approximately mid-October of 2016. Because a variety of water users and facility operators utilize the river for water deliveries, drainage, or flood control between Friant Dam and the Merced River, numerous operational and coordination challenges were encountered and resolved to achieve a connected river and somewhat consistent flow levels. Overall, the Program was successful in undertaking that coordination and in obtaining cooperation from other river users.[1]

- The Program undertook the sale and exchange of just over 318,000 AF of URF's in 2017. Although URF's are generated due to the inability of the Program to send full Restoration Flows down the river as directed by the Settlement, the successful disposition of the URF's to the benefit of the Program required considerable effort in terms of compliance, coordination and contracting by the Program. Sales of URF's provided revenue of over $6 M for supporting the Restoration Goal.

- The Program released more than 90,000 juvenile spring-run Chinook salmon into Reach 5 of the San Joaquin River, of which 52,000 were produced at the Program's Interim Salmon Conservation and Research Facility (iSCARF) and the balance were sourced from the Feather River Fish Hatchery. This release continues Program efforts towards meeting Settlement Paragraph 14 requirements. Juvenile releases in Reach 5 are downstream of the major physical passage impediments.

- The Program completed and published the Fiscal Year 2017 Annual Work Plan.

- The Program commenced an effort to update the Framework for Implementation, by evaluating a "funding constrained" option wherein the Program would identify specific actions for implementation that would be within the boundaries of known funding commitments. The Program led numerous stakeholder meetings and discussions, working towards a "Funding Constrained Framework" plan.

[1] 2015 had zero Restoration Flows because it was a Critical Low year; per the Settlement no Restoration Releases were required. 2014 was a Critical High year which under the Settlement would have required 70 TAF of Releases but that agreements were reached not to release those flows and Reclamation -CVO- determined that releases from Friant Dam for SJREC's in the spring and summer would take precedence over Restoration Flows

- The Program continued work on the Reach 4B decision process, and released an administrative draft EIS for the Reach 4B project.[2]
- A 2017 Channel Capacity Report was published by the Channel Capacity Advisory Group (CCAG) to determine and update estimates of then-existing channel capacities in the Restoration Area, to ensure Restoration Flows would be kept below levels that would increase flood risk.
- The National Marine Fisheries Service (NMFS) completed and released the 2017 Technical Memorandum that outlined the spring-run Chinook salmon release and monitoring plans, plus methodology for identification of spring-run Chinook salmon outside of the San Joaquin River.
- The California Department of Fish and Wildlife (CDFW) started construction on the permanent Salmon Conservation and Research Facility (SCARF), although the high flood control releases did cause some complications with the early phases of excavation.

Progress toward Achieving Paragraph 11 Requirements during 2017

Paragraph 11 identifies required channel and structural improvements that must be developed and implemented to fulfill the Settlement. Sub-paragraph 11(a) identifies the highest priority (Phase 1) improvements, and sub-paragraph 11(b) identifies Phase 2 improvements, which are also high priority improvements, but whose implementation is not to delay completion of Phase 1 improvements. It was anticipated that the Paragraph 11(a) improvements could be developed and implemented in accordance with the milestone dates included in Exhibit C of the Settlement.

Paragraph 11(a) identifies ten separate projects/actions (in subsections 11(a) (1) through 11(a)(10)) that were to be completed by December 31, 2013, subject to Paragraphs 21(c), 24, 36, and other provisions of the Settlement. By December 31, 2017, none of the ten projects/actions set forth in Paragraph 11(a) were completed.

Many planning, permitting, design and stakeholder outreach tasks required for implementation of the Paragraph 11(a) projects have been completed, as documented herein, in previous Annual Reports, and on the SJRRP web site (http://www.restoresjr.net/). Drafts of the Funding Constrained Framework mentioned above included a schedule for when the Paragraph 11(a) projects will be completed, given the current status of work, anticipated funding levels in future years, and known challenges to implementation. The Funding Constrained Framework utilizes a staged approach, wherein the first stage of implementation would implement as many components of the Program as possible within the boundaries of known funding sources and with additional Program elements shifted to a second, future stage.

[2] Note that in early 2018, the Reach 4B decision process was put on hold as a result of the Funding Constrained Framework.

Under the staged approach, the Program elements tagged for inclusion in Stage 1 (as of the end of 2017) included:

Table 1. Key SJRRP Major Construction Actions Schedule for Completion in Stage 1 of the Funding Constrained Framework

Stage 1, FY 2017 to FY 2024	
Primary Goal – Begin the reestablishment of spring-run and fall-run Chinook salmon through the establishment of volitional fish passage and sufficient flows to manage temperatures and provide for the basic habitat needs of the species	
Flow-Related Activities	• Seepage projects up to 2,500 cfs • Levee stability projects up to 2,500 cfs
Restoration Goal Activities	• Mendota Pool Bypass • Mendota Pool Fish Screen • Levees in Reach 2B to convey 2,500 cfs through Reach 2B and 2,000 cfs into the Mendota Pool • Arroyo Canal Fish Screen and Sack Dam Fish Passage • Salmon Conservation and Research Facility • Fish passage and levee stability actions in the Middle Eastside Bypass
Water Management Goal Activities	• Award remaining funding to non-federal partners to move forward with the construction of the Friant-Kern Canal and Madera Canal Capacity Correction projects
Although not construction actions, Stage 1 will also consist of the operations of the facilities constructed along with a number of minor projects and activities.	

The following actions would be delayed to a future stage (paragraph number references refer to paragraph numbers in the Settlement). Some of these actions are Paragraph 11 (a) actions, or directly required for Paragraph 13 actions. The latest version of the Funding Constrained Framework is available on the Program website.

- Flow Actions
  - Re-consultation on Flows for Restoration Flow releases greater than about 2,500 cfs in Reach 2B (needed for Para. 13)
  - Acquisition of Unexpected Seepage Loss water (Para. 13 action)
  - Seepage and levee stability projects above 2,500 cfs (needed for Para. 13)
- Channel and Structural Improvements
  - Modifications in San Joaquin River channel capacity to the extent necessary to ensure conveyance of at least 475 cfs through Reach 4B (Para. 11(a)(3)). The routing decision for 4B is also deferred to a future stage; thus the ultimate flow capacity of Reach 4B is not known.
  - Land acquisition, permitting, final design, and construction of the Reach 4B, Eastside Bypass and Mariposa Bypass Channel and Structural Improvements Project (Para. 11(a))
  - Planning, design, and construction of the Salt and Mud Slough Barriers Project (Para. 11(a)).
  - Planning, design, and construction of the following projects: identify the highest priority gravel pits in Reach 1 (Paragraph 11(b)(3)); and modifications to the Chowchilla Bypass Bifurcation Structure to provide fish passage and prevent entrainment (Paragraph 11(b)(2)).
  - Planning and construction of all Paragraph 12 Projects

- Fish Reestablishment
  - Developing a phasing out strategy for the Conservation Facility and annual spring-run donor stock collection and tagging, then phase out Conservation Facility and donor stock collection
- Water Management Goal and Friant Division Improvements
  - Additional recapture and recirculation opportunities
  - Investment Strategy Projects
  - New Financial Assistance for Groundwater Banking projects

The Funding Constrained Framework was largely completed in 2017, using updated cost and schedule assumptions. Further, the target 2500 cfs flow level for Stage 1 of the Funding Constrained Framework was justified via extensive analysis by Program and Implementing Agency engineers and biologists.

The Funding Constrained Framework process was intended to sharpen the focus of the Program to the most vital projects and actions for the next 7 fiscal years. It will require ongoing focus for the Program to be successful in implementing $640 M of actions scheduled and budgeted in the Funding Constrained Framework.

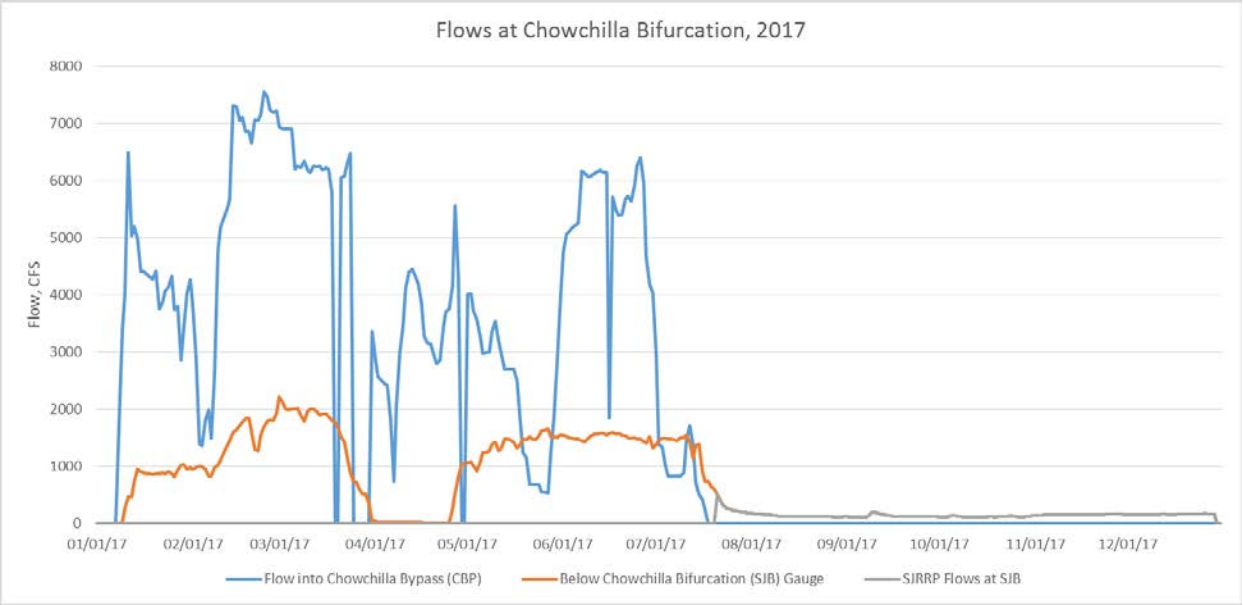
Progress toward Achieving Paragraph 13 Requirements during 2017

Settlement Paragraph 13 (Paragraph 13) and Exhibit B of the Settlement outline Restoration Flow requirements, and Restoration Flows formally commenced on January 1, 2014. Unfortunately, severe drought conditions in 2014 and 2015 resulted in no Restoration Flow releases or allocation for the Restoration Program occurred beyond mid-February 2014. The Program began to release Restoration Flows in mid-February 2016, and achieved a fully connected river with Restoration Flows between Friant Dam and the Merced River by mid-October of 2016. Restoration flows, or flood control releases, maintained river connectivity throughout 2017.

Flood control releases from Friant Dam provided flows often orders of magnitude greater than Restoration Flows through the first half of 2017. However, due to fast-moving and rapidly changing flood control obligations, flows down the river were far from steady, and flow routing varied between the river channel and flood conveyance pathways (below the Chowchilla Bifurcation). Substantial flow contributions from the Kings River into Mendota Pool and Reach 3 further complicated flood routing decisions.

Figure 1 shows the relative flow split between the San Joaquin River and the Chowchilla Bypass during 2017. Since this was the first year that Restoration Flows were released in conjunction with high flood control releases, numerous lessons were learned that will inform future operations.

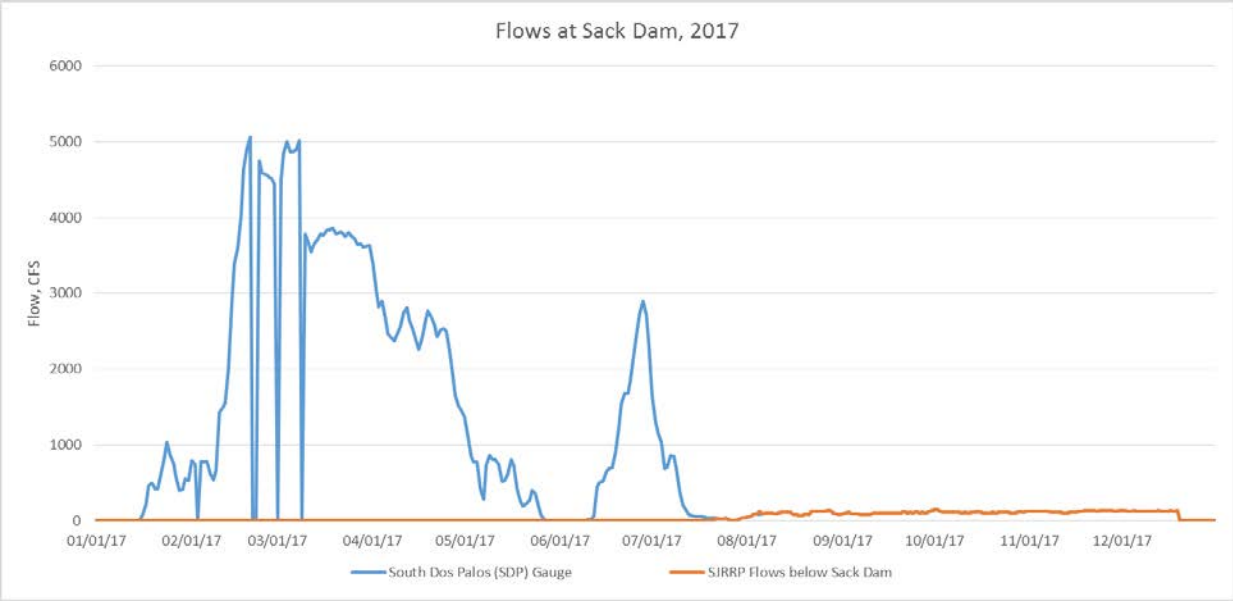
Figure 1. Flows at the Chowchilla Bifurcation 20171



A variety of water users and facility operators utilize the river for water deliveries, drainage, and flood control between Friant Dam and the Merced River; many conduct operations year-round. Numerous operational and coordination challenges were encountered and resolved in order to effect a connected river and somewhat consistent flow levels. One operational challenge was a failure to release Restoration Flows from Mendota Pool during late July and August of 2017. A series of calls and letters between the RA, the Program, and river operators eventually restored Restoration Flows. Again, numerous lessons were learned that will inform future communications, operations and oversight. Restoration flows do vary from targets, sometimes widely; however progress is being made in maintaining consistent flows within target ranges.

In addition to flow releases, progress was made on Restoration Flow Guidelines (RFG's), which are the rules and protocols for releasing and accounting for Restoration Flows. Although various rules and issues remain to be addressed, operational experience is informing the crafting of acceptable RFG's.

Figure 2. Flows at Sack Dam, 2017



Progress toward Achieving Paragraph 14 Requirements during 2017

Settlement Paragraph 14 and the enabling Federal legislation require completion of several actions by the NMFS and the U.S. Fish and Wildlife Service (USFWS) relating to reintroduction of fall-run and spring-run Chinook salmon.

The Program has completed several tasks and activities that are necessary to effect a long-term reintroduction; however, the success of the long-term reintroduction hinges to a large degree on the successful completion of the physical channel modifications pursuant to Paragraph 11. As envisioned in the Settlement, initial runs of spring-run and fall-run Chinook would be established while Interim and Restoration Flow releases occurred, and as improvements to channel and other infrastructure were completed. The Restoration Goal is based on the premise of achieving volitional fish movement in a connected, flowing river.

Pending completion of the Paragraph 11 modifications, the Program is undertaking interim measures to continue the process of reintroduction, build fish stocks, and to continue to glean valuable monitoring data to further inform future adaptive management actions. Specifically, in 2017:

- The Program continued to develop brood stock at the iSCARF, utilizing selected foundation stock from the Feather River Fish Hatchery.
- The Program selected, transported and released over 90,000 juvenile spring run Chinook in 2017 of which 52,000 were born and raised at the iSCARF and the balance were from the Feather River Fish Hatchery. All of the released fish were marked with coded wire tags, and recapture of a few juveniles at the Delta pump facilities indicates that at least some of the fish successfully emigrated from the San Joaquin River.

- The Program planned to monitor for returning spring run Chinook during the spring of 2017; however due to very high flood control releases (up to 8,000 cfs released from Friant Dam, and up to 12,000 plus cfs at the monitoring location), that monitoring effort was not possible.
- The Program released a total of 130 adult spring run Chinook into the San Joaquin River downstream of Friant Dam to monitor fish distribution and movement, holding locations, spawning locations and spawning success. Releases were made in May and August; CDFW undertook extensive monitoring (including acoustic tracking, spawning site monitoring and escapement surveys).
- CDFW broke ground on the Conservation Hatchery. Construction proceeded through 2017; completion is set for fall 2018.
- The Program produced a Fisheries Framework document, intended to establish a realistic schedule for implementation of the fisheries management actions in the SJRRP based upon the best available science and information. The Fisheries Framework includes (1) goals and objectives for establishing spring-run and fall-run Chinook salmon populations in the Restoration Area; (2) habitat and ecosystem conditions that will support naturally reproducing, self-sustaining salmon populations; (3) the scientific foundation for the planned management actions; and (4) a proposed Adaptive Management process and implementation plan. The final draft was circulated for public comment; numerous commenters provided input through 2017. A Final document is expected in 2018.

4 Findings of Research and Data Collection

In the past few years, the SJRRP Implementing Agencies performed numerous technical studies per year, with many of those studies being multi-year, multi-disciplinary or multi-agency efforts. Currently, many study efforts are focused on evaluating specific conditions to inform design.

In 2017, considerable effort was invested in biological monitoring of Chinook salmon. Adult and juvenile releases and subsequent monitoring were undertaken, and spring run holding and spawning success was evaluated. Flow, temperature and riparian response were evaluated for the connected river, along with extensive and consistent groundwater level monitoring to gauge seepage impacts.

Detailed reports for some of the technical and biological monitoring and study efforts can be found in CDFW or Program annual reports, Program updates, and under the "Science" section of the Program website (http://www.restoresjr.net/science/). However, many data streams and/or study results or reports lag the data collection efforts by many months, and a fair amount of data may be circulated to an internal Program audience but not published on line.

A Science Meeting was not held in 2017; there will be a Science Meeting in 2018.

The Program has amassed a tremendous body of data, research, analysis, results and reports – and, is struggling with management of the material. Most Principal Investigators (PI's) have a firm grasp on the data and work products from their studies and freely furnish data and work products within the Program, but those products are not necessarily broadly known within or outside of the Program and not necessarily

immediately available to a more casual user (e.g., materials are not necessarily searchable or available on the web, only by direct contact with the PI). The Program is considering data management systems and techniques, but has not yet committed to the needed wholesale restructuring of data warehousing.

5 Challenges for 2018 and Beyond

Mitigation Requirement

The 2015 - 2016 Annual Report spoke to the massive burden of mitigation for its existence that the Program bears. It is worth restating the breadth and scale of the near-term and perpetual mitigation burden of a Program that is primarily charged with "undoing" a portion of the anthropomorphic changes wrought on the San Joaquin River. The mitigation burden is extremely costly, has added years to the implementation timeline for the Program, and occasionally directly conflicts with the Restoration Goal.

A short summary of the mitigation burden of the Program is included in Appendix A; a more detailed discussion can be found in the 2015-2-18 Annual Report.

Funding Constrained Framework

The Funding Constrained Framework process posed some challenging questions for the Program. Initially during the process, the Program's strong tendency was to seriously understate Program costs going forward and the speed with which actions would be implemented. Once corrected, the program budget for Phase 1 actions was nearly $200 M over the available funding, requiring substantial cost reduction efforts.

It remains to be seen whether the Program will be able to hold the line on costs and adhere to the schedule outlined in the Funding Constrained Framework. To date (and as discussed in previous Annual Reports), few actions undertaken by the Program have been completed on time and within budget. There will need to be relentless focus on schedule and budget, and associated creative thinking on how to shorten timelines and reduce costs, in order to complete the Funding Constrained Framework Stage 1 actions as imagined.

Restoration Flow Operational Challenges

During the fall of 2016 and throughout 2017, numerous challenges to the smooth release of Restoration Flows were encountered. Challenges were both physical (e.g. flow gauges that are constantly out of calibration due to the geomorphology of the river bed, seepage losses greater than anticipated) and operational (e.g. the need to coordinate with, and heavily rely on, downstream operators who may have priorities that do not align with Program priorities or interests). Program staff, particularly the Program Flow Coordinator, associated staff, and Friant Dam operations personnel did an outstanding job of coordinating with various agencies, operators and stakeholders to make Restoration Flows happen. It is

recognized that Restoration Flows are a new paradigm for the San Joaquin River, and full integration of the requirements of the Settlement and Restoration Flows may take a few years to accomplish. It will take continued perseverance and vigilance by the Program to make sure Restoration Flows flow unimpeded and as-scheduled until the Program is an accepted fact on the San Joaquin River.

Physical Passage Challenges

Mendota Pool and Arroyo Canal/Sack Dam remain as physical barriers to the passage of adult and juvenile salmonids. Although specific remedies for those barriers are included in the Funding Constrained Framework (and design work is scheduled for 2018 and 2019 for the Paragraph 11(a) remedies for those barriers), full relief is still several years away. Until such time as volitional passage is possible through the Restoration area, reintroduction activities will have only limited success.

Staffing and Organization Chart

Program staff attrition is a constant challenge. The Program attracts highly capable staff and is a highly challenging work assignment. For a variety of reasons (moving on, and usually up) Program staff have ample opportunities to find other positions. The Program does not particularly plan for vacancies (e.g. all key staff find, recruit and train their prime lieutenant); thus turnover of key staff is always a disruption to progress of the Program.

Project logistics present a constant challenge to Program staff. The San Joaquin River Restoration area is 2 to 3 hour drive from the Program office; the Restoration area itself is one to two hours from top to bottom. As a result, a few hours of meetings with stakeholders in the Restoration area may consume a full day or more.

Finally, the focus of the Program is shifting, and with it staffing needs. The Program is well structured for the types of planning, permitting, and stakeholder engagement that has been the primary focus of the early years of Program operations. However, the Program is not well structured for the types of project management, schedule and budget control, engineering and construction oversight that will be the primary focus of the next few years. Of $174 M of Program expenditures through FY 2016, over 40% was spent on land and land actions (for seepage), 26% on Program administration, and probably well less than 10% on design and construction. For the FY 2018 – 2024 period, design and construction (including land acquisition) will be on the order of 75% of expenditures, land acquisitions for seepage at 13% of expenditures, and all other planning, permitting, administration and operations at 12%. There seems to be a clear need to revisit the Program organizational structure to address this pending refocus.

Land Impact and Procurement Issues

This challenge was described in previous Annual Reports, and is worth mentioning again. The Program will need to procure, mitigate, or secure thousands of acres of land in fee, via easement, or as some sort

of mitigation. Mitigation for seepage impacts (up to 20,000 + acres assessed, easement procured and/or otherwise mitigated), land for construction (10,000 acres plus, depending on alignments, in fee or for construction access), and land for mitigation (potentially several thousand acres for agricultural lands preservation and giant garter snake habitat mitigation). In total, land payments to secure fee title, easements, or to address mitigation obligations will total hundreds of millions of dollars. The federal process for valuing and securing land or easements is exacting and slow; the vast area to be addressed in some way by the Program will make this a formidable challenge for the duration of the Program.

6 Recommendations (for Addressing Challenges)

In addition to carrying through on the balance of recommendations from prior years, the following are offered as recommendations that may address to some degree specific challenges faced by the Program described above:

Funding Constrained Framework Implementation

Implementation of the Funding Constrained Framework within the budget and schedule agreed to by the Settling Parties and stakeholders will require relentless focus on schedule and budget efficiency by the Program, as well as anticipation of challenges, continuous marshalling of support from elected officials as well as other departments within Reclamation, and constant communications with a bevy of stakeholders. The Program should develop an implementation plan that includes the basics of the plan: organization and staffing chart(s), schedule, budget (and budget tracking scheme), and an enumeration of key support required from outside of the Program (e.g. support from Reclamation's Solicitors Office, land procurement, contracting, construction, etc.). The Implementation plan should be shared with Reclamation senior management and key stakeholders (e.g. non-federal settling parties), to build support and commitment for the plan.

Restoration Flow Operational Challenges

The Program is working through operational challenges to provide smooth and consistent Restoration Flow releases on a daily and monthly basis – as stated elsewhere, full integration and acceptance of the Restoration Flow paradigm by all of the river operations interests and stakeholders is probably a three to five year process. In addition to the as-needed resolution of challenges that the Program currently undertakes, it may be helpful to capture operational issues that will take longer to work through and prioritize them for attention. In addition, it may be timely to convene seminar(s) or working group meeting(s) of all or key subsets of river operators in order to be able to address challenges across the various layers of operations management (field staff to executive leaders/policy makers).

Extend use of the Middle and Lower East Side Bypass flood conveyance system for Restoration Flows was not envisioned in the Settlement; and the operators of the flood conveyance system (the Lower San Joaquin Levee District) has pointed out various maintenance and operational issues associated with having Restoration Flows present in the flood system. The Program is taking steps to work with the Levee District to find a solution to the needs for habitat in the bypass, maintenance of flood flow capacity, and

issues surrounding a potentially increased maintenance burden for the Levee District. Program staff, assisted by Department of Water Resources, must continue to work to resolve these issues with the levee District.

Staffing and Org Chart

The Program can re-think the staffing needs and organizational chart in light of the forthcoming work and task focus outlined in the Funding Constrained Framework. In particular, bolstering staff with individuals capable of managing complex design, construction and stakeholder management projects should be a priority. Every Project Manager (or other key staff positions) should have a designated second-in-command or lieutenant, to ease transitions during the inevitable staff turnover.

With regards to logistics, a certain degree of logistical inconvenience is inevitable associated with management of the Program given its footprint. However, the Program can investigate and utilize alternative forms of communication (e.g. video conferencing), and needs to carefully consider staff travel assignments to minimize the travel burden on Program staff.

Land Impact and Procurement Issues

Reclamation's process for land acquisition is complex, includes numerous steps and checks, and will not be revised solely in favor of the Program. However, in recognition of the huge land acquisition commitment that Reclamation has made in the Settlement, it would be prudent for Reclamation to evaluate the Program's land acquisition obligations to find opportunities for efficiency. Delays and avoidable challenges to Program land procurement needs (e.g. staff not available, deadlines slipped, and delays in processing documents) will lead to cumulative slowdown of months if not years, and avoidable costs to Reclamation (and taxpayers) of millions of dollars. The Program should convene discussions as necessary among and between the Program, Regional senior management, and all divisions and departments with a role in the land acquisition for the Program. The Agenda should be focused on finding ways, over the next 3 to 5 years of key land procurement activities, to streamline Program land acquisition activities.

7 Specific RA and TAC Activities Completed During 2017

The RA and TAC completed a variety of tasks during 2017 to support and contribute to SJRRP Implementing Agency efforts as required by the Settlement.

- The RA provided Restoration Flow Recommendations throughout 2017, to respond to changing conditions and updated Restoration Flow Allocations.
- RA transmittal of the RA 2015-2016 Annual Report to the Settling Parties on April 21, 2017;

- The RA and the TAC were involved in numerous meetings and discussions regarding various Program initiatives, including:
    - Funding Constrained Framework;
    - Draft Fisheries Framework;
    - 2B Stakeholder process, including the 2B Value Review Process
    - 4B Decision process, including review of Admin draft EIS, drafting an RA report on 4B alternatives. Note the 4B process was put on hold in the fall due to work on the Funding Constrained Framework;
    - Monitoring seepage well status with regards to permissible Restoration Flows;
    - Input on fisheries monitoring activities in response to flood control operations;
    - Potential modifications to studies in response to flood control conditions;
    - Input on fisheries actions and fisheries management decisions related to flood control operations;
    - RFG meetings;
    - Water supply, Hydrology and flood control planning including flow coordination calls with Friant Dam operators, SCCAO, and Friant managers;
    - Weekly flow management conference calls;
    - Improvements in runoff and water supply forecasting including ASO Program

Bi-Monthly TAC Convened by the RA

Bi-Monthly coordination calls involving TAC members were convened to address restoration issues, updates on meetings recently attended by TAC members, and general program updates. These meetings (conference calls) were useful in improving coordination among TAC members, and usually occurred twice per month throughout 2017.

RA Weekly Telephone Conferences with Alicia Forsythe (SJRRP Program Manager)

The RA met via telephone on Monday mornings for between 30 minutes and one hour with Alicia Forsythe (SJRRP Program Manager) throughout the year to discuss upcoming events, program schedule, emerging issues, coordination of efforts and other matters.

RA and TAC Member Participation in Regular Water Quality, Monitoring and Flow Scheduling Conference Calls

The SJRRP initiated regular conference calls involving the Implementing Agencies, Settling Parties and RA/TAC to address water quality, flow monitoring and flow scheduling issues. These meetings contributed to improving communication between the various SJRRP participants on a range of flow scheduling and monitoring needs and activities.

RA Participation in Monthly Settling Party Consultation Meetings

The RA attended Settling Party Consultation Meetings convened throughout 2017. These meetings included the Program Manager and representatives of the Settling Parties and Implementing Agencies. These meetings focused on significant policy issues that needed the attention of SJRRP participants.

Participation in other SJRRP Technical and Stakeholder Meetings

In 2017 the RA and/or members of the TAC participated in numerous technical work group and technical feedback meetings:

- Water Management Goal Technical Feedback meeting (approximately quarterly throughout 2017)
- The RA participated as available in Fisheries Management Workgroup monthly meetings
- The RA and TAC participated in numerous Restoration Flow Guidelines revision meetings and workshops.
- Monthly Board Meetings convened by the SJR Resource Management Coalition (as available)

8 Priority Tasks for 2018

The following are the primary tasks for the RA, supported by the Technical Advisory Committee (TAC), for 2018.

1. Provide flow prescriptions in a timely fashion, in consultation with TAC, to the Implementing Agencies and water interests, pursuant to and in conformance with the Settlement.
2. Maintain connected river. It will be a top priority to maintain a fully connected river for 365 days. The RA will need to work with Program to:
    a. Effect more effective and timely flow bench evaluation protocol, to allow more timely flow changes and ramps
    b. Continue to work with on-river interests to promote the consistency of Restoration Flows
    c. Work with Program to improve operational coordination down the river, and to eliminate unauthorized withdrawals and avoidable losses.
3. Participate in Restoration Flow Guidelines (RFG 2.1 and subsequent process(es), being led by Reclamation.
4. Arroyo Canal & Sack Dam Re-Design. Participate as the Program works through re-design of Arroyo Canal/Sack Dam to account for subsidence.
    - This project has been floating "on hold" for a few years. The extent of re-design and associated cost increase to address subsidence is unknown; a major or complete redesign may be necessary. Has the potential to be a cost or schedule roadblock.

5. Tracking Sequence and Schedule for 2B and Balance of Phase 1. Need to develop critical path schedule for 2B in particular, as well as balance of Phase 1 of the Funding Constrained Framework. Key potential issues include land acquisition and design team limitations; secondary issues include archaeology, GG snake, actual contracting and construction.
    - By far the largest component of Phase 1, the potential for schedule delays and associated cost overruns is huge. Will need constant monitoring for signs of slippage.
    - The Program's land acquisition is slow, and to date has dramatically impacted (in a negative way) progress in implementing the Program. Investigate with the Program potential improvements to the land acquisition process.
6. Prepare for Construction. The first construction contracts will be let in 2019 or 2020; Program staffing for contracting, construction management and feedback (to inform subsequent design and construction) will all need to be in place.
    - Contracting and construction efficiency, and good feedback to subsequent phases of design and construction will be paramount to keep things on time and within budget. It will be imperative that Reclamation assign good contract and construction management personnel to these specific projects; the sooner that those people can be selected and start to advise the Program team the better.
7. Revisit Seepage Management strategy and process. Cost of purchasing seepage easements, combined with potential losses from the river via seepage may suggest a different strategy with greater use of interceptors and flow return to the river. Additionally, the process for either easement acquisition or construction of physical projects is quite slow, are there alternatives (e.g. funding agreement options for physical projects) that could accelerate the timeline.
8. Work with Flood Interests to identify common interests and refine priorities. On many (most?) other California rivers flood control, habitat, species of concern and flows are integrated goals, with recognized trade-offs and balancing between the interests. Need to develop & manage relationships, and if necessary carve out a priority for river and Restoration operations alongside the flood programs. Engage with DWR and/or State Lands as a potential bridge. The Program (possibly DWR) needs a dedicated Project Manager for coordination with flood interests and landowners, pursuing pilot and reveg programs and projects, etc.
9. 4B pilot program – investigate sinuosity & vegetation. Work with Program and flood interests to design and implement a pilot program to evaluate management techniques (e.g. revegetation) that can benefit both flood control and Program interests. Promote and participate in a reconnaissance-level evaluation of summer and fall ecological flow thresholds in Reach 4 and 5 to inform RA flow targets in these downstream reaches to support the Restoration Goal

9 2017 RA and TAC Expenditures

The following summary of expenditures was provided by National Fish and Wildlife Foundation (NFWF), the administrator of the grant that funds operations of the RA and TAC.

RA – TAC Expenditures 2017

RA & TAC Invoices

Organization	2017 Totals
Tom Johnson	$149,800.79
Bill Luce Consulting (Friant Water Authority 43275 - CLOSED)	$7,824.00
Hanson Environmental Inc.	$9,342.00
McBain Associates	$20,105.25
The Bay Institute (NRDC 43276 - CLOSED)	$31,814.14
Trout Unlimited, Inc.	$8,978.00
FlowWest, Inc.	$20,281.80
NFWF	$12,000.00
Total	$260,145.98

Task Order Invoices

Organization	Task Order Invoice
FlowWest, Inc. 1 - CLOSED	$3,000.00
FlowWest, Inc. 2 - CLOSED	$9,568.15
Total	**$12,568.15**

TAC Hours

Organization	Hours
Tom Johnson	818.00
Bill Luce Consulting	48.00
Hanson Environmental Inc.	54.00
McBain Associates	170.50
The Bay Institute	215.25
Trout Unlimited, Inc.	67.00
FlowWest, Inc.	120.75
Total	1,493.50

Task Order Hours

Organization	Task Order Hours
FlowWest, Inc. 1	22.00
FlowWest, Inc. 2	55.00
Total	77.00

Total Funds	**$272,714.13**
Total Hours	**1,570.50**

Appendix A: San Joaquin Restoration Program – Overview of Required Mitigation

The Program is also charged with mitigating the impacts of the Program, including not only the Paragraph 11 (a) improvements, but also the Paragraph 13 flows and Paragraph 14 Restoration Actions. The San Joaquin River Restoration Settlement Act (Act) specifies, at Sec 10004 (d):

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

Additionally, at Sec 10004 (h)(3):

> *The Secretary shall reduce Interim Flows to the extent necessary to address any material adverse impacts to third parties from groundwater seepage caused by such flows that the Secretary identifies based on the monitoring program of the Secretary.*

Reclamation has interpreted these provisions to require avoiding impacts from Program implementation on current irrigation, agriculture, and flood control needs rather than the irrigation, agriculture and flood control users accommodating river restoration. This has led to cost consequences that may not have been fully envisioned at the crafting of the Settlement and Act, such as:

- While the suite of required construction projects and flows necessary for the success of a restoration program were studied prior to the crafting of the Settlement, the full suite of potential impacts, the extent of seepage, and the required mitigation were not fully understood nor budgeted for, and
- Assessing the *potential for* impacts is often highly subjective and includes both tangible and intangible elements, and is very costly in time and financial resources.

In many instances, the best way to assess impacts would be to implement the SJRRP action, then monitor the specific actual effects of the SJRRP to identify appropriate mitigation. However, the Program is generally taking the approach of mitigation impact avoidance, which has almost universally required a much more conservative (and costly) implementation. For example, Reclamation estimates that the Program may require mitigation of seepage impacts on as much as 23,000 acres of agricultural land, even though Restoration Flows result in lower flows than would have occurred prior to the construction of Friant Dam or currently during flood control releases. On the current cost trajectory, mitigation of seepage impacts through purchase of easement or construction of projects (e.g. interceptor lines) may cost between $200 M and $400 M over the life of the Program. In addition, monitoring during the implementation of the program (operation of 125+ monitoring wells) and potential for long-term monitoring for the duration of the Program will add millions more in costs. Of note, updates to the Seepage Management Plan currently in progress will make assessment of seepage impacts somewhat less conservative and may allow more flexible water release operations, but will still require permanent mitigation for the full potentially impacted acreage.

In addition to mitigating impacts to water users and landowners, the Program is accruing many construction-related and permanent operations and monitoring mitigation commitments through numerous extensive environmental reviews and permitting processes.

The environmental review process generally "…includes activities necessary to demonstrate that all potential project-related impacts to the human, natural, and cultural environment are identified; effects of those impacts are taken into consideration (among other factors such as economic or community benefits) before a final decision is made; the public is included in that decision-making process; and all state, tribal, or federal compliance requirements applicable as a result of the project's environmental impacts are, or will be, met."[3]

In addition to environmental review, all of the major Paragraph 11 projects and facilities will include extensive permitting and coordination with a variety of jurisdictional entities, including:

- US Army Corps of Engineers (Section 404, 408 Permits)
- National Marine Fisheries Service (Endangered Species Act (ESA) Sec. 7 Consultation, National Environmental Policy Act (NEPA) Compliance)
- US Fish and Wildlife Service (ESA Sec. 7, NEPA Compliance, Fish and Wildlife Coordination Act Compliance)
- State Historic Preservation Office (National Historic Preservation Act Sec 106 Consultation)
- US Coast Guard (Bridge Permit)
- Central Valley Regional Water Quality Control Board (Clean Water Act Sec 401 Certification)
- State Water Resources Control Board (Water Rights, Sec 402 Permit)
- CDFW (California Endangered Species Act Sec 2081 Determination, 1602 Streambed Permit)
- Central Valley Flood Protection Board (California Code of Regulations Title 23 Encroachment Permit)
- State Lands Commission (State Lands Lease)
- San Joaquin Valley Air Pollution Control District (Clean Air Act consistency)
- Various County building and encroachment permits

The following is a list of long-term and permanent (i.e. not just planning or construction-related) commitments by the Program included in the Record of Decision for the Program:

- Monitor erosion and perform maintenance and/or reduce Interim and Restoration flows as necessary to avoid erosion-related impacts. On-going monitoring of levee conditions, including observations for erosion, seepage, boils, impaired emergency levee access, or other indications of flood risk. Field surveys of potential erosion sites would be conducted annually. This is a permanent obligation.
- Flow monitoring at seven permanent gauges plus flow event monitoring in perpetuity.
- Implement seepage management plan; current operations include operation of over 125 groundwater monitoring wells, and construction of projects and/or purchase of easements to

[3] Luther, L. April 2012. The Role of the Environmental Review Process in Federally Funded Highway Projects: Background and Issues for Congress. Congressional Research Service, Washington, D.C.

protect between 18,000 and 23,000 acres of farm land. This will occur only during implementation of Program.

- Implement the channel capacity group, including monitoring and assessment actions. This will occur only during implementation of Program.
- Long-term vegetation monitoring and management actions, during implementation of Program.
- Long--term spawning gravel monitoring and enhancement actions, during implementation of Program.
- Mitigate trout fishing opportunities lost as a result of the Program *" …by enhancing public fishing access and trout populations on the Kings River below Pine Flat Dam"* during implementation of Program.
- Mitigate warm-water fishing opportunities that may be lost as a result of the Program *"…by enhancing remaining warm-water fishing opportunities or creating new opportunities in the vicinity"* during implementation of Program.
- Preserve agricultural productivity; to do so, Reclamation will, as necessary, either (1) acquire agricultural conservation easements at a 1:1 ratio, or (2) provide provision of funds to a land trust or government program that conserves agricultural land sufficient to obtain easements on comparable land at a 1:1 ratio.
- Implement a Recreation Outreach Program.
- Biological monitoring (e.g. steelhead monitoring, monitoring for returning adult spring-run, etc.)
- Implement a monitoring and maintenance plan for 10 years after completion of the final phase of the Program.

Construction-related mitigation and monitoring is extensive. Potentially substantially costly measures will likely include:

- Securing 1,270 acres of giant garter snake mitigation habitat
- Address impacts to Swainson's hawk where projects include a state partner, or under the Migratory Bird Treaty Act.
- Implement project-specific mitigation and monitoring – for example, the "Environmental Commitment Plan and Tracking Program" for the Reach 2B improvements (pursuant to Paragraph 11(a)) runs 55 pages.

Overall, mitigation of the "impacts" of the Restoration Program will total hundreds of millions of dollars, take decades to implement, and will result in further monitoring and potential additional mitigation measures in the future.

The "mandate to mitigate" included in the Act is probably the primary driver of schedule slippage and cost challenges described in most every Annual Report.

Appendix B: Excerpts from Funding Constrained Framework

Summary of Obligated and Expended Funds for FY 2007 to FY 2015 for the San Joaquin River Restoration Program By Project
--- Note the total amount is confirmed, but the breakout by project is general for the reasons noted below.

	Obligated FY 07 to FY 16	Expended FY 07 to FY 16
Administration & Program Management*	$ 55,115,996	$ 45,758,108
Restoration Goal Activities	**$ 17,608,369**	**$ 14,528,323**
Mendota Pool Bypass/Reach 2B Improvements	$ 5,360,173	$ 5,226,056
Reach 4B/ESB/MB Channel & Structural Improvements	$ 2,442,805	$ 1,982,175
Arroyo Canal Fish Screen & Sack Dam Fish Passage	$ 4,650,917	$ 4,650,914
Salt & Mud Slough Seasonal Barriers	$ 98,119	$ 98,119
Gravel Pit Filing and/or Isolation	$ 2,062,417	$ 179,151
Fisheries Reintroduction Activities	$ 2,993,937	$ 2,391,909
Flow-Related Activities	**$ 149,411,203**	**$ 97,650,844**
Flow-Related Activities (General Cost Authority)	$ 32,559,179	$ 28,549,443
Seepage Management	$ 116,852,024	$ 69,101,401
Water Management Goal Activities	**$ 31,531,270**	**$ 14,416,749**
Paragraph 16 Activities	$ 10,013,676	$ 8,701,502
Friant-Kern & Madera Canal Capacity Restoration	$ 6,411,463	$ 4,067,822
Reverse Flow Facilities	$ 3,590,779	$ 290,779
PART III	$ 11,515,351	$ 1,356,645
Other Settlement/Legislation Required Activities	**$ 1,627,703**	**$ 1,627,541**
Viability Study	**$ 55,222**	**$ 55,221**
Wolfsen v US	**$ 11,611**	**$ 11,611**
Total	**$ 255,361,374**	**$ 174,048,398**

Note - This "by project" outlay is very rough. In the early years of the Program, activities were charged to general cost authority numbers. These are all included in the Administration and Program Management line item here. This significantly overstates this line item and under states all other items. However, there simply is not the detail to break this down further at this time. In addition, until FY 2014, the Flow-related item was a general cost authority covering all aspects of flows management, seepage management, Monitoring and Analysis Plan activities, and to some extent, fish reintroduction. It is not possible to break these items down further at this time with any level of accuracy. However, a conservative general assumption is that 65% of the Flow-related line item was for seepage actions.

Other Settlement Required Activities was generally the last contract for the PEIS/R, Reclamation's staff time to complete the document and Reclamation's time to modify its water rights at Friant Dam to implement the SJRRP.

Viability Study was the Chowchilla Bypass Viability Study.

Summary of SJRRP Estimated Future Activities and Costs for FY 17 to FY 24
Federal and State Funding Sources
All values in Thousands and in Various $ (Assumes 2.89% Inflation Rate)

Activity/Project Title	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	Estimated Cost (Various $)
Administration and Program Management	**$6,730**	**$10,772**	**$8,905**	**$9,050**	**$7,203**	**$6,013**	**$6,186**	**$5,011**	**$59,869**
Reclamation[1]	$1,885	$1,845	$1,898	$1,953	$1,507	$1,034	$1,064	$547	$11,734
USFWS	$1,751	$1,714	$1,764	$1,815	$1,400	$960	$988	$508	$10,901
NMFS	$1,029	$1,007	$1,036	$1,066	$823	$564	$581	$299	$6,405
DWR	$522	$1,124	$1,157	$1,190	$706	$726	$747	$768	$6,939
DFW	$1,543	$5,081	$3,050	$3,026	$2,767	$2,728	$2,807	$2,888	$23,890
Flow-Related Activities	**$7,302**	**$7,221**	**$17,744**	**$24,196**	**$14,894**	**$20,435**	**$16,408**	**$1,403**	**$109,604**
Conservation Strategy and Flow-related Mitigation Measures	***$561***	***$1,319***	***$704***	***$3,417***	***$2,977***	***$885***	***$559***	***$509***	***$10,931***
Conservation Strategy	$0	$0	$0	$0	$0	$0	$0	$0	$0
Invasive Species Control	$0	$0	$0	$1,681	$0	$0	$0	$0	$1,681
Vegetation Monitoring & Other	$51	$0	$0	$59	$0	$0	$65	$0	$175
Reconsultation on Flows	$0	$0	$0	$0	$1,828	$0	$0	$0	$1,828
Implement Conservation Strategy Actions for Flows	$0	$0	$0	$0	$0	$0	$0	$0	$0
Channel Capacity Advisory Group (Includes Erosion Monitori	$509	$535	$441	$1,126	$583	$599	$495	$509	$4,797
Physical Monitoring and Management Plan Implementation	$0	$0	$0	$0	$0	$0	$0	$0	$0
Steelhead Monitoring	$0	$255	$263	$270	$278	$286	$0	$0	$1,352
Programmatic Cultural Resources Consultation	$0	$529	$0	$280	$288	$0	$0	$0	$1,098
Millerton Lake Boat Ramps	$0	$0	$0	$0	$0	$0	$0	$0	$0
Traffic Detour Planning	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sand Slough / Eastside Bypass Sand Removal	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flow Management and Monitoring	***$908***	***$437***	***$449***	***$798***	***$821***	***$845***	***$997***	***$895***	***$6,150***
Daily Flow Management and Monitoring	$79	$86	$89	$91	$94	$97	$99	$102	$737
Stream Gaging	$292	$209	$215	$222	$228	$235	$369	$248	$2,019
Unexpected Seepage Losses	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unreleased Restoration Flows	$37	$40	$41	$43	$44	$45	$46	$48	$345
Restoration Flow Guidelines	$33	$34	$35	$36	$37	$38	$39	$40	$289
Data Management	$54	$56	$58	$59	$61	$63	$65	$66	$482
MAP Actions to Inform Flow Decisions	$401	$0	$0	$336	$346	$356	$366	$377	$2,182
Water Right Annual Report	$11	$11	$12	$12	$12	$13	$13	$13	$97
Seepage Actions	***$4,290***	***$3,454***	***$5,046***	***$17,068***	***$8,789***	***$18,705***	***$14,851***	***$0***	***$72,204***
Levee Stability Actions (not a SJRRP cost)	***$1,543***	***$2,011***	***$11,545***	***$2,913***	***$2,306***	***$0***	***$0***	***$0***	***$20,319***
Restoration Goal Activities	**$25,774**	**$40,455**	**$26,777**	**$192,019**	**$56,905**	**$39,007**	**$20,307**	**$31,262**	**$432,506**
Phase I Projects[2]	***$23,413***	***$17,431***	***$18,275***	***$187,213***	***$53,914***	***$36,648***	***$16,054***	***$26,887***	***$379,834***
Mendota Pool Bypass, Fish Screen, and Reach 2B Levees	$22,881	$16,875	$18,171	$151,450	$48,657	$36,502	$15,721	$26,544	$336,803
Reach 4B/ESB/MB Channel and Structural Improvements	$522	$73	$54	$0	$0	$119	$305	$314	$1,387
Arroyo Canal Fish Screen and Sack Dam Fish Passage	$10	$483	$50	$35,762	$5,256	$27	$28	$29	$41,645
Salt and Mud Slough Seasonal Barriers	$0	$0	$0	$0	$0	$0	$0	$0	$0
Passage at Key Barriers to Migration	$480	$794	$7,086	$2,331	$445	$332	$342	$352	$12,161
Phase II Projects	***$325***	***$0***	***$0***	***$840***	***$865***	***$297***	***$305***	***$314***	***$2,946***
Reach 4B/ESB High Flow Routing	$0	$0	$0	$0	$0	$0	$0	$0	$0
Chowchilla Bifurcation Structure Fish Passage	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gravel Pit Filing and/or Isolation	$325	$0	$0	$840	$865	$297	$305	$314	$2,946
Fisheries Recolonization Activities	***$1,555***	***$22,230***	***$1,416***	***$1,635***	***$1,682***	***$1,731***	***$3,606***	***$3,710***	***$37,565***
Conservation Facility Construction (DFW cost)	$0	$20,854	$0	$0	$0	$0	$0	$0	$20,854
Conservation Facility Water Supply Line (Reclamation cost)	$617	$0	$0	$0	$0	$0	$0	$0	$617
Conservation Facility Operations and Maintenance	$720	$783	$806	$829	$853	$878	$3,051	$3,139	$11,060
Donor Stock Collection	$0	$90	$92	$272	$280	$288	$297	$305	$1,625
Trap and Haul (short-term and as needed)	$0	$280	$288	$296	$305	$314	$0	$0	$1,482
Genetics Monitoring	$218	$224	$230	$237	$244	$251	$258	$266	$1,927
Segregation Actions	$0	$0	$0	$0	$0	$0	$0	$0	$0
Paragraph 12 Activities	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***
Water Management Goal Activities	**$1,275**	**$8,430**	**$6,266**	**$17,596**	**$1,316**	**$1,354**	**$1,393**	**$1,434**	**$39,066**
Water Management Goal Oversight[3]	$1,235	$1,209	$1,244	$1,279	$1,316	$1,354	$1,393	$1,434	$10,464
Recapture and Recirculation Activities[4]	$0	$0	$0	$0	$0	$0	$0	$0	$0
Friant-Kern and Madera Canal Capacity Restoration[5]	$25	$7,200	$5,000	$16,305	$0	$0	$0	$0	$28,530
Reverse Flow Facilities[6]	$5	$11	$12	$12	$0	$0	$0	$0	$40
Financial Assistance for Friant Division Improvements	$10	$11	$11	$0	$0	$0	$0	$0	$32
Miscellaneous and/or Opportunistic Actions	**$189**	**$265**	**$272**	**$280**	**$288**	**$297**	**$305**	**$314**	**$2,210**
Total Estimated Federal Funding Need	**$41,270**	**$67,143**	**$59,964**	**$243,142**	**$80,606**	**$67,106**	**$44,599**	**$39,424**	**$643,255**

Notes and Assumptions:

1. Includes Program-wide activities including public outreach (annual report, Quarterly Updates, and similar) and data management.
2. Costs for the Phase I Projects are based on design estimates. Actual costs for individual projects will vary as implementation progresses and projects progress through the design stages. Includes the following for each project: environmental compliance efforts; planning and design; public outreach; land acquisition; pre and during construction mitigation measures; construction; post-construction mitigation measures and performance monitoring, and long-term operations and maintenance, if applicable. Assumes costs are obligated in these years, actual construction may take longer. All construction costs are indexed to June 2017 dollars.
3. Includes annual recapture and recirculation actions and managing Recovered Water Accounts.
4. Moved into a future phase. Includes additional funding for expaned recapture opportunities.
5. Assumes through completion of Madera Canal Capacity Correction Project environmental compliance. Moves implementation costs out to a future phase.
6. Reverse flow facilities are not included as part of the Core Program in the June 2012 Framework for Implementation. These costs are for managing the Secure Water Act - Drought Relief funded project.

Summary of SJRRP Estimated Future Federal Activities and Costs for FY 17 to FY 24
All values in Thousands and in Various $ (Assumes 2.89% Inflation Rate)

Activity/Project Title	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	Total Estimated Cost (Various $)
Administration and Program Management	**$4,665**	**$4,567**	**$4,699**	**$4,834**	**$3,730**	**$2,559**	**$2,633**	**$1,354**	**$29,040**
Reclamation[1]	$1,885	$1,845	$1,898	$1,953	$1,507	$1,034	$1,064	$547	$11,734
USFWS	$1,751	$1,714	$1,764	$1,815	$1,400	$960	$988	$508	$10,901
NMFS	$1,029	$1,007	$1,036	$1,066	$823	$564	$581	$299	$6,405
DWR	$0	$0	$0	$0	$0	$0	$0	$0	$0
DFW	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flow-Related Activities	**$4,786**	**$4,604**	**$5,685**	**$19,746**	**$11,582**	**$19,401**	**$15,465**	**$434**	**$81,704**
Conservation Strategy and Flow-related Mitigation Measures	***$57***	***$790***	***$268***	***$2,296***	***$2,401***	***$292***	***$71***	***$7***	***$6,181***
Conservation Strategy									
Invasive Species Control	$0	$0	$0	$1,681	$0	$0	$0	$0	$1,681
Vegetation Monitoring & Other	$51	$0	$0	$59	$0	$0	$65	$0	$175
Reconsultation on Flows	$0	$0	$0	$0	$1,828	$0	$0	$0	$1,828
Implement Conservation Strategy Actions for Flows	$0	$0	$0	$0	$0	$0	$0	$0	$0
Channel Capacity Advisory Group (Includes Erosion Monitoring)	$5	$6	$6	$6	$6	$6	$6	$7	$48
Physical Monitoring and Management Plan Implementation	$0	$0	$0	$0	$0	$0	$0	$0	$0
Steelhead Monitoring	$0	$255	$263	$270	$278	$286	$0	$0	$1,352
Programmatic Cultural Resources Consultation	$0	$529	$0	$280	$288	$0	$0	$0	$1,098
Millerton Lake Boat Ramps	$0	$0	$0	$0	$0	$0	$0	$0	$0
Traffic Detour Planning	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sand Slough / Eastside Bypass Sand Removal	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flow Management and Monitoring	***$439***	***$360***	***$371***	***$381***	***$392***	***$404***	***$543***	***$427***	***$3,318***
Daily Flow Management and Monitoring	$79	$86	$89	$91	$94	$97	$99	$102	$737
Stream Gaging	$224	$133	$137	$141	$145	$149	$281	$158	$1,369
Unexpected Seepage Losses	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unreleased Restoration Flows	$37	$40	$41	$43	$44	$45	$46	$48	$345
Restoration Flow Guidelines	$33	$34	$35	$36	$37	$38	$39	$40	$289
Data Management	$54	$56	$58	$59	$61	$63	$65	$66	$482
MAP Actions to Inform Flow Decisions	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Right Annual Report	$11	$11	$12	$12	$12	$13	$13	$13	$97
Seepage Actions	***$4,290***	***$3,454***	***$5,046***	***$17,068***	***$8,789***	***$18,705***	***$14,851***	***$0***	***$72,204***
Levee Stability Actions (not a SJRRP cost)	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***
Restoration Goal Activities	**$24,734**	**$18,749**	**$19,747**	**$190,495**	**$55,706**	**$38,248**	**$16,292**	**$27,131**	**$391,102**
Phase I Projects[2]	***$23,148***	***$17,373***	***$18,215***	***$187,202***	***$53,902***	***$36,518***	***$15,737***	***$26,560***	***$378,655***
Mendota Pool Bypass, Fish Screen, and Reach 2B Levees[3]	$22,881	$16,870	$18,166	$151,439	$48,646	$36,490	$15,709	$26,532	$336,733
Reach 4B/ESB/MB Channel and Structural Improvements	$257	$20	$0	$0	$0	$0	$0	$0	$277
Arroyo Canal Fish Screen and Sack Dam Fish Passage	$10	$483	$50	$35,762	$5,256	$27	$28	$29	$41,645
Salt and Mud Slough Seasonal Barriers	$0	$0	$0	$0	$0	$0	$0	$0	$0
Passage at Key Barriers to Migration	***$31***	***$0***	***$115***	***$1,659***	***$122***	***$0***	***$0***	***$0***	***$1,926***
Phase II Projects	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***
Reach 4B/ESB High Flow Routing	$0	$0	$0	$0	$0	$0	$0	$0	$0
Chowchilla Bifurcation Structure Fish Passage	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gravel Pit Filing and/or Isolation	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fisheries Recolonization Activities	***$1,555***	***$1,377***	***$1,416***	***$1,635***	***$1,682***	***$1,731***	***$555***	***$571***	***$10,521***
Conservation Facility Construction (DFW cost)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Conservation Facility Water Supply Line (Reclamation cost)	$617	$0	$0	$0	$0	$0	$0	$0	$617
Conservation Facility Operations and Maintenance	$720	$783	$806	$829	$853	$878	$0	$0	$4,870
Donor Stock Collection	$0	$90	$92	$272	$280	$288	$297	$305	$1,625
Trap and Haul (short-term and as needed)	$0	$280	$288	$296	$305	$314	$0	$0	$1,482
Genetics Monitoring	$218	$224	$230	$237	$244	$251	$258	$266	$1,927
Segregation Actions	$0	$0	$0	$0	$0	$0	$0	$0	$0
Paragraph 12 Activities	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***
Water Management Goal Activities	**$1,275**	**$8,430**	**$6,266**	**$17,596**	**$1,316**	**$1,354**	**$1,393**	**$1,434**	**$39,066**
Water Management Goal Oversight[3]	$1,235	$1,209	$1,244	$1,279	$1,316	$1,354	$1,393	$1,434	$10,464
Recapture and Recirculation Activities[4]	$0	$0	$0	$0	$0	$0	$0	$0	$0
Friant-Kern and Madera Canal Capacity Restoration[5]	$25	$7,200	$5,000	$16,305	$0	$0	$0	$0	$28,530
Reverse Flow Facilities[6]	$5	$11	$12	$12	$0	$0	$0	$0	$40
Financial Assistance for Friant Division Improvements	$10	$11	$11	$0	$0	$0	$0	$0	$32
Miscellaneous and/or Opportunistic Actions	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Estimated Federal Funding Need	**$35,460**	**$36,350**	**$36,396**	**$232,671**	**$72,335**	**$61,562**	**$35,783**	**$30,353**	**$540,912**

Notes and Assumptions:

1. Includes Program-wide activities including public outreach (annual report, Quarterly Updates, and similar) and data management.
2. Costs for the Phase I Projects are based on design estimates. Actual costs for individual projects will vary as implementation progresses and projects progress through the design stages. Includes the following for each project: environmental compliance efforts; planning and design; public outreach; land acquisition; pre and during construction mitigation measures; construction; post-construction mitigation measures and performance monitoring, and long-term operations and maintenance, if applicable. Assumes costs are obligated in these years; actual construction may take longer. All construction costs are indexed to June 2017 dollars.
3. Includes annual recapture and recirculation actions and managing Recovered Water Accounts.
4. Moved into a future phase. Includes additional funding for expaned recapture opportunities.
5. Assumes through completion of Madera Canal Capacity Correction Project environmental compliance. Moves implementation costs out to a future phase.
6. Reverse flow facilities are not included as part of the Core Program in the June 2012 Framework for Implementation. These costs are for managing the Secure Water Act - Drought Relief funded project.