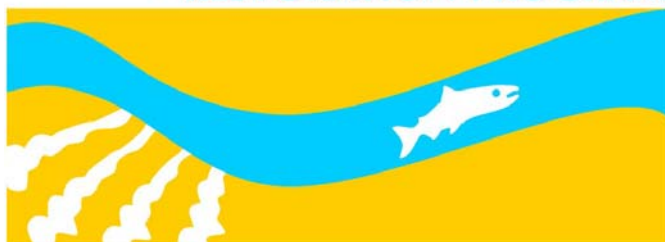


# 2011 Draft Annual Technical Report

SAN JOAQUIN RIVER  
RESTORATION PROGRAM





# Table of Contents

<b>1.0</b>	<b>Introduction.....</b>	<b>4</b>
1.1	Report Organization.....	5
<b>2.0</b>	<b>2010 Summary .....</b>	<b>9</b>
2.1	Allocation .....	9
2.2	Flow .....	10
2.3	Channel Capacity.....	12
2.4	Temperature.....	12
2.5	Seepage.....	14
2.6	Water Quality .....	15
2.7	Sediment .....	15
2.8	Aerials Analysis and Inundation Modeling .....	<b>Error! Bookmark not defined.</b>
2.9	Fisheries.....	15
<b>3.0</b>	<b>Monitoring Network .....</b>	<b>18</b>
<b>4.0</b>	<b>Models and Analytical Tools.....</b>	<b>24</b>
<b>5.0</b>	<b>Conclusions.....</b>	<b>25</b>
<b>6.0</b>	<b>References.....</b>	<b>26</b>

**Figures and Tables**

Figure 2-1. Unimpaired Runoff Forecasts at Friant Dam.....10  
Table 2-1 2011 Interim Flow Releases.....10  
Figure 2-2 2011 San Joaquin River Flows.....11  
Figure 2-3. 2011 Friant Dam Forebay Temperature Profiles.....13  
Figure 2-4. 2011 San Joaquin River Temperatures .....14  
Figure 2-5. 2011 Minimum Depth to Groundwater .....15  
Table 2-2 2011 Reclamation Bathymetric and Water Surface Profile  
Surveys.....20  
Table 2-3 2011 USGS Sediment Sampling Dates.....22  
Figure 2-5 USGS Sediment Sampling Location Upstream of  
Chowchilla Bifurcation Structure.....22  
Table 2-4. San Joaquin River Flows (cfs) on 2011 Aerial Flight  
Dates.....23  
Table 4-1. Analytical Tools for SJRRP .....24

**Appendices**

Appendix A Problem Statements and Information Needs  
Appendix B Reports  
Appendix C Surface Water Stage and Flow  
Appendix D Surface Water Quality  
Appendix E Sediment  
Appendix F Fisheries  
Appendix G Groundwater  
Appendix H Surveys / Topography  
Appendix I Monitoring and Management Plans

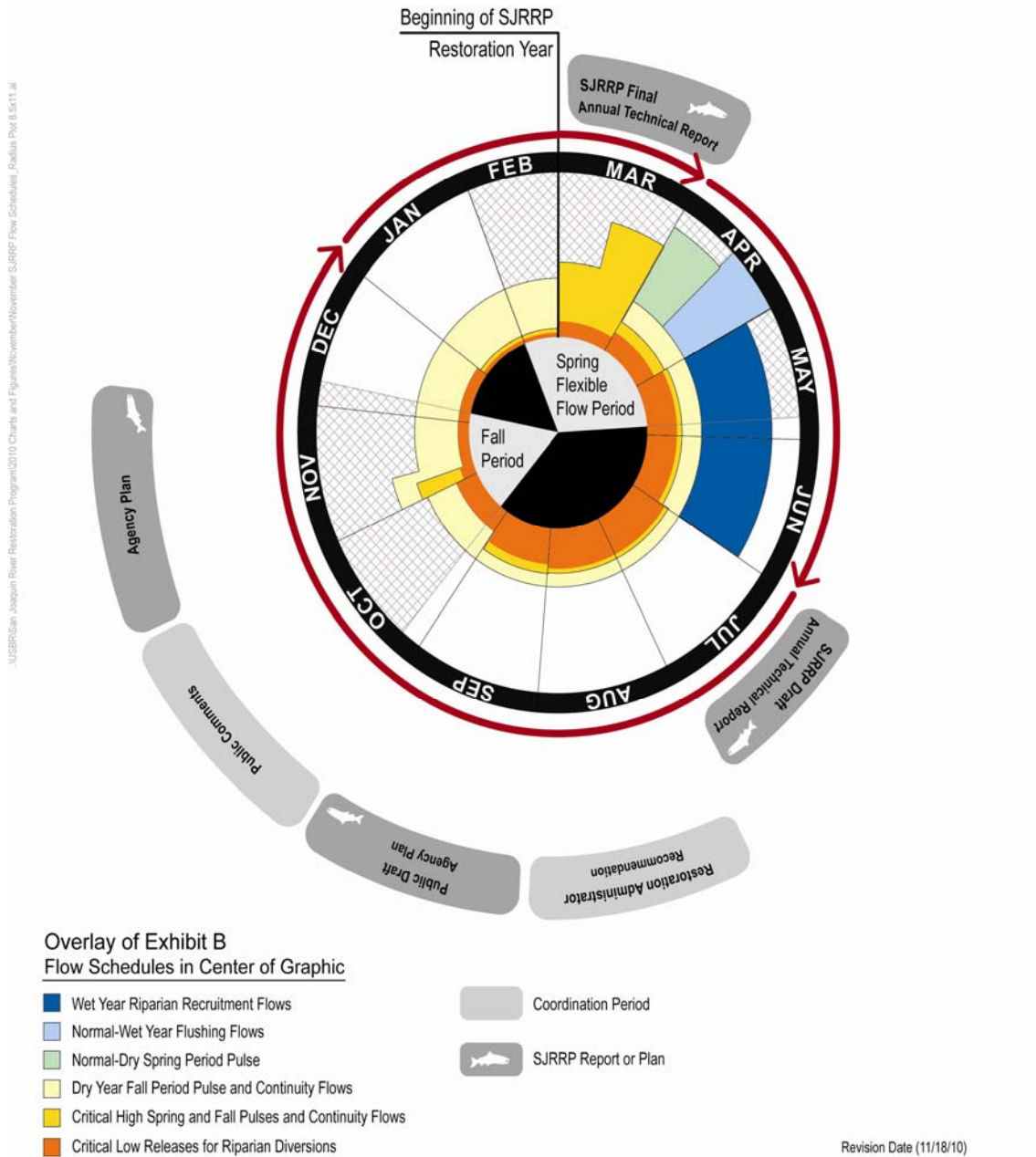
# Abbreviations and Acronyms

ADCP	Acoustic Doppler Current Profiler
ATR	Annual Technical Report
CCID	Central California Irrigation District
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
cfs	cubic feet per second
CVHM	Central Valley Hydrologic Model
CVP	Central Valley Project
Delta	Sacramento-San Joaquin Delta
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EC	electrical conductivity
FMP	Fisheries Management Plan
FMWG	Fisheries Management Work Group
NMFS	National Marine Fisheries Service
PG&E	Pacific Gas and Electric Company
RA	Restoration Administrator
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	River Mile
RWQCB	Regional Water Quality Control Board
Settlement	Stipulation of Settlement in <i>NRDC, et al. v. Kirk Rodgers, et al.</i>
SJRRP	San Joaquin River Restoration Program
SMN	San Joaquin River above Merced River near Newman
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TAF	thousand acre-feet
TSC	Technical Services Center
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Services
USGS	U.S. Geological Survey
WR	Water Right
WY	water year

# 1 1.0 Introduction

2 The San Joaquin River Restoration Program (SJRRP) is a comprehensive long-term  
3 effort to restore flows and a self-sustaining Chinook salmon fishery to the San Joaquin  
4 River from Friant Dam to the confluence of Merced River, while reducing or avoiding  
5 adverse water supply impacts. More information on the SJRRP is available at  
6 <http://www.restoresjr.net>.

7 This Annual Technical Report (ATR) presents an incremental update for monitoring and  
8 analysis results from the first half of calendar year 2011 (refer to **Figure 1-1**). The ATR  
9 along with the Monitoring and Analysis Plan (MAP, formerly known as Agency Plan) are  
10 SJRRP annual reporting and planning documents. These documents help link monitoring  
11 and analysis efforts to the decision making processes they are designed to support,  
12 forming the scientific basis for San Joaquin River operations downstream from Friant  
13 Dam. The ATR tracks long-term strategies for SJRRP implementation in problem  
14 statements and identifies information needs as uncertainties to be resolved in order to  
15 implement the Stipulation of Settlement in *NRDC, et al., v. Kirk Rodgers, et al.*  
16 (Settlement). The ATR allows the Implementing Agencies to present to stakeholders the  
17 status and results of technical work to address SJRRP needs and solicit feedback.



1

2

**Figure 1-1. Schedule of Monitoring and Reporting**

3

## 4 1.1 Report Organization

5 The main body of the ATR summarizes monitoring and analysis results for the calendar  
 6 year to date. Appendix A introduces problem statements, which track long-term

1 implementation approaches and are supported by information needs describing specific  
2 knowledge gaps to be addressed through studies. The modular format of Appendix A  
3 allows technical challenges to be addressed as new information becomes available, and  
4 removed from further analysis when they have been resolved. Some appendices include  
5 data atlases as attachments. Data reports present raw data from monitoring activities.  
6 Reports are stand-alone documents providing updated monitoring and analysis results.  
7 Atlases provide monitoring results and the monitoring network for a particular resource  
8 area. A brief description of the document organization is presented in the bullets below.

- 9 • **Section 1.0 Introduction** – the purpose and structure of the Annual Technical  
10 Report.
- 11 • **Section 2.0 2010 Summary** – key monitoring and analysis results from 2010.
- 12 • **Section 3.0 Monitoring Network** – a description of the components monitored  
13 and presentation of monitoring locations.
- 14 • **Section 4.0 Models and Analytical Tools** – a description of available numerical  
15 models for analysis.
- 16 • **Section 5.0 Conclusions** – a description of results and revised understanding of  
17 physical and biological systems based upon monitoring data.
- 18 • **Appendix A. Problem Statements and Information Needs** –problem statements  
19 and information needs for 2010 including:
  - 20 ○ Gravelly Ford Flow Targets,
  - 21 ○ Unexpected Seepage Losses Downstream from Gravelly Ford
  - 22 ○ Seepage Management
  - 23 ○ San Joaquin River Channel Capacity Management
  - 24 ○ Mature Spawners
  - 25 ○ Healthy Fry Production
  - 26 ○ Smolt Outmigrants
  - 27 ○ Smolt Survival
  - 28 ○ Adult Recruits
  - 29 ○ Adult Passage.
- 30 • **Appendix B. Reports** – 2011 monitoring and analysis results.

- 1 • **Appendix C. Surface Water Stage and Flow Atlas** – a description of  
 2 monitoring methodology and presentation of surface water stage and flow data  
 3 (15-min./hourly stream gage data and periodic manual measurements).
- 4 • **Appendix D. Surface Water Quality** –a summary of water quality  
 5 measurements conducted January – June 2011. Real-time data are compared with  
 6 grab samples collected during five surveys at nine sites along the river.
- 7 • **Appendix E. Sediment** – a description of monitoring methodology and  
 8 presentation of suspended sediment data, and bed mobility data.
- 9 • **Appendix F. Fisheries** –placeholder for fisheries data.
- 10 • **Appendix G. Groundwater Atlas** – a description of monitoring methodology,  
 11 groundwater levels, record of hotline calls, daily seepage evaluations, and flow  
 12 bench evaluations.
- 13 • **Appendix H. Topography** – a description of methodology and survey data.
  - 14 ○ Bathymetric Surveys
  - 15 ○ Monitoring Sections
    - 16 ■ Topographic Surveys
    - 17 ■ Sample Lines and Section Views
  - 18 ○ Water Surface Profiling
    - 19 ■ Water Surface Elevations
    - 20 ■ Discharge Measurements
    - 21 ■ Bed Profile Surveys
  - 22 ○ Habitat Mapping
  - 23 ○ Aerial Photos [placeholder, atlas development in progress]
  - 24 ○ Vegetation Surveys [placeholder]
- 25 • **Appendix I. Monitoring and Management Plans** –
  - 26 ○ Fisheries Management Plan
  - 27 ○ Seepage Management Plan
  - 28 ○ Sediment Management Plan [placeholder]

## San Joaquin River Restoration Program

- 1           ○ Vegetation Management Plan [placeholder]
- 2           ○ Flow (see PEIS/R)
- 3           ○ Channel Capacity Management Plan [placeholder]
- 4           SJRRP anticipates revisions to the structure and function of the ATR as the Program
- 5           continues to develop improved coordination mechanisms and a better understanding
- 6           of implementation requirements.

## 1   **2.0   2011 Summary**

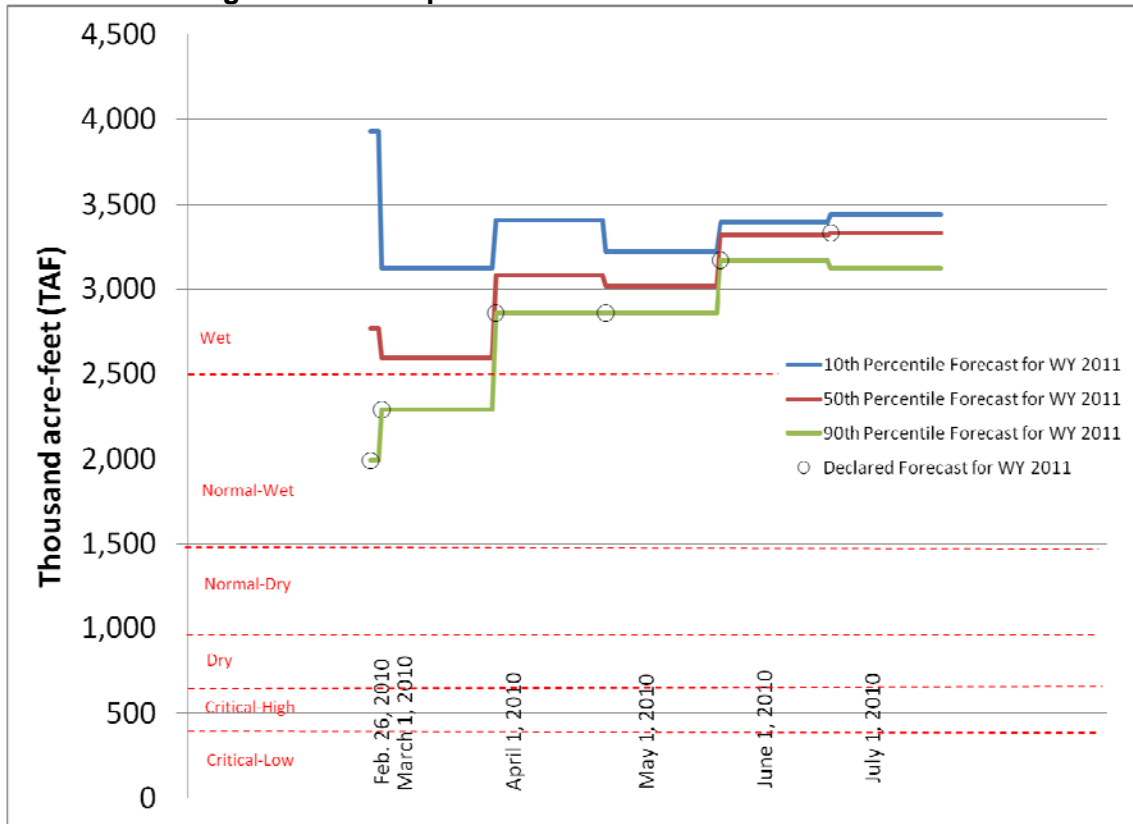
2   The Settlement requires a period of Interim Flows prior to full Restoration Flows in order  
3   to collect relevant data concerning flows, temperatures, fish needs, seepage losses,  
4   recirculation, recapture and reuse. Interim Flows monitoring and analysis results  
5   contribute to the scientific basis for San Joaquin River operations downstream of Friant  
6   Dam and support decisions on implementation. This section summarizes monitoring and  
7   analysis results; for descriptions of monitoring activities refer to Section 3.0 and the  
8   Appendixes to this ATR.

### 9   **2.1 Allocation**

10   The flow schedule for Interim Flows depends on the annual unimpaired runoff at Friant  
11   Dam and RA recommendations. At the start of the restoration year on March 1, the water  
12   supply is uncertain and requires forecasting. U.S. Department of the Interior, Bureau of  
13   Reclamation (Reclamation) water supply forecasts include 10 percent, 50 percent, and 90  
14   percent exceedance estimates for total unimpaired runoff at Friant Dam. In the RFG  
15   Reclamation may declare a water supply between the 50 and 90 percent probability for  
16   use in scheduling flows. The February forecast resulted in a Normal-Wet year-type,  
17   increased to a Wet year-type in April and stayed Wet through June as illustrated in  
18   **Figure 2-1**. Channel capacity constraints limit the amount of water released for the  
19   SJRRP.

1

**Figure 2-1. Unimpaired Runoff Forecasts at Friant Dam**



2

3 **2.2 Flow**

4 SJRRP releases Interim Flows based on Settlement flow targets and consistent with  
 5 SJRRP environmental documents. Before changing releases from Friant Dam,  
 6 Reclamation conducted flow bench evaluations to determine if downstream constraints  
 7 permitted releases according to the RA Recommendations. Constraints to 2011 Interim  
 8 Flows include channel capacities, groundwater elevations, Mendota Pool water quality,  
 9 Mendota Pool water user demand, and flood management requirements. Friant Dam flow  
 10 changes during 2011 Interim Flows are displayed in **Table 2-1** below.

**Table 2-1 2011 Interim Flow Releases**

Release Date	Friant Dam Release (cfs)	Comment
January 1	flood control releases	Begin Calendar Year 2011. Flood control releases began December 26, 2010, and peaked at over 6,000 cfs on January 5, 2011.
February 1	200	Interim flows resumed. Interim flows were limited to allow for recession of high groundwater

		following flood flows.
March 4	700	Adjusted to meet RA flow target
March 21- June 30	2500-7500	Flood control releases
Details of flow changes for flood control releases available on the Surface Water page at <a href="http://www.restoresjr.net">www.restoresjr.net</a> .		

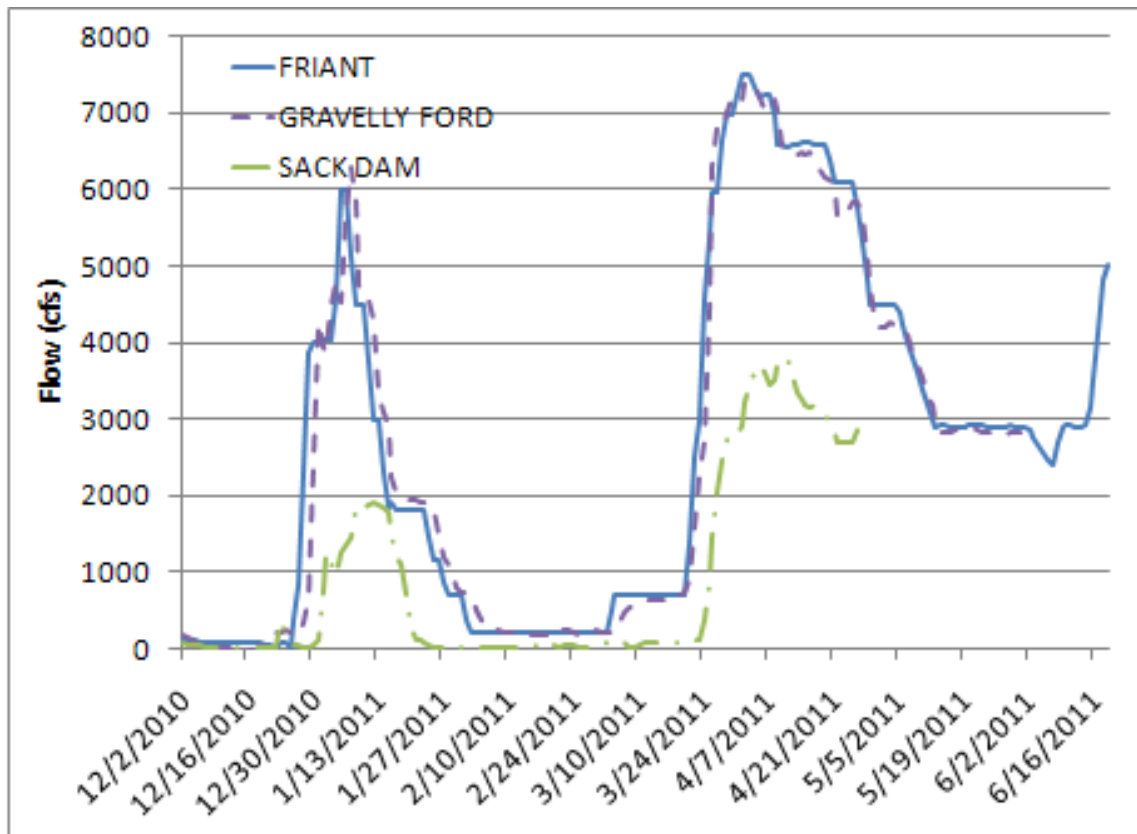
1

2 **Figure 2-2** below summarizes San Joaquin River releases during 2011.

3

4

**Figure 2-2 2011 San Joaquin River Flows**



5

6

Source: QA/QC flow records

7

CDEC codes: Friant (Reclamation)= MIL; Gravelly Ford (Reclamation)= GRF; Sack Dam (DWR)= SDP

8

The U.S. Geological Survey (USGS), Reclamation, and the California Department of Water Resources (DWR) continue to take manual streamflow measurements to support development of continuous flow records at stream gage sites consistent with Flow, Sediment, and Channel Capacity Monitoring and Management Plans. Additional manual streamflow measurements were made at certain sites that do not have stream gages. Flood control releases during 2011 provided an opportunity to collect water surface profile, bathymetry, cross-section surveys, and discharge data at high flows. Methods and data from these monitoring efforts are summarized in Section 3, and presented in **Reports and Data Appendices**.

16

## 1 **2.3 Channel Capacity**

### 2 **2.3.1 Water Surface Elevations & Discharge Measurements**

3 A preliminary comparison of the surveyed and computed water surface profiles based on  
4 the current 1-D HEC-RAS model indicates that the majority of significant hydraulic  
5 controls were sufficiently characterized by survey data. Preliminary comparisons of the  
6 survey data, and current model results also indicate that additional model calibration is  
7 necessary and can now be performed in numerous locations where previous calibration  
8 data didn't exist.

### 9 **2.3.2 Water Level Recorders**

10 The stage data were converted as water surface elevations using survey information and  
11 are displayed in Report: Additional Water Level Recorders. Generally, the water level  
12 recorder results correlated well with the water surface profile survey.

### 13 **2.3.3 Monitoring Cross Sections**

14 Results of the Spring 2011 DWR surveys are planned to be included in the 2011 Final  
15 Annual Technical Report.

16 The results from February bed material samples were compared with earlier samples and  
17 presented in the Bed Sampling Report. The comparison showed that some sites exhibited  
18 significant changes in material size while others showed slight or no changes. No general  
19 pattern on changes in material size was observed between each seasonal interim flow  
20 release.

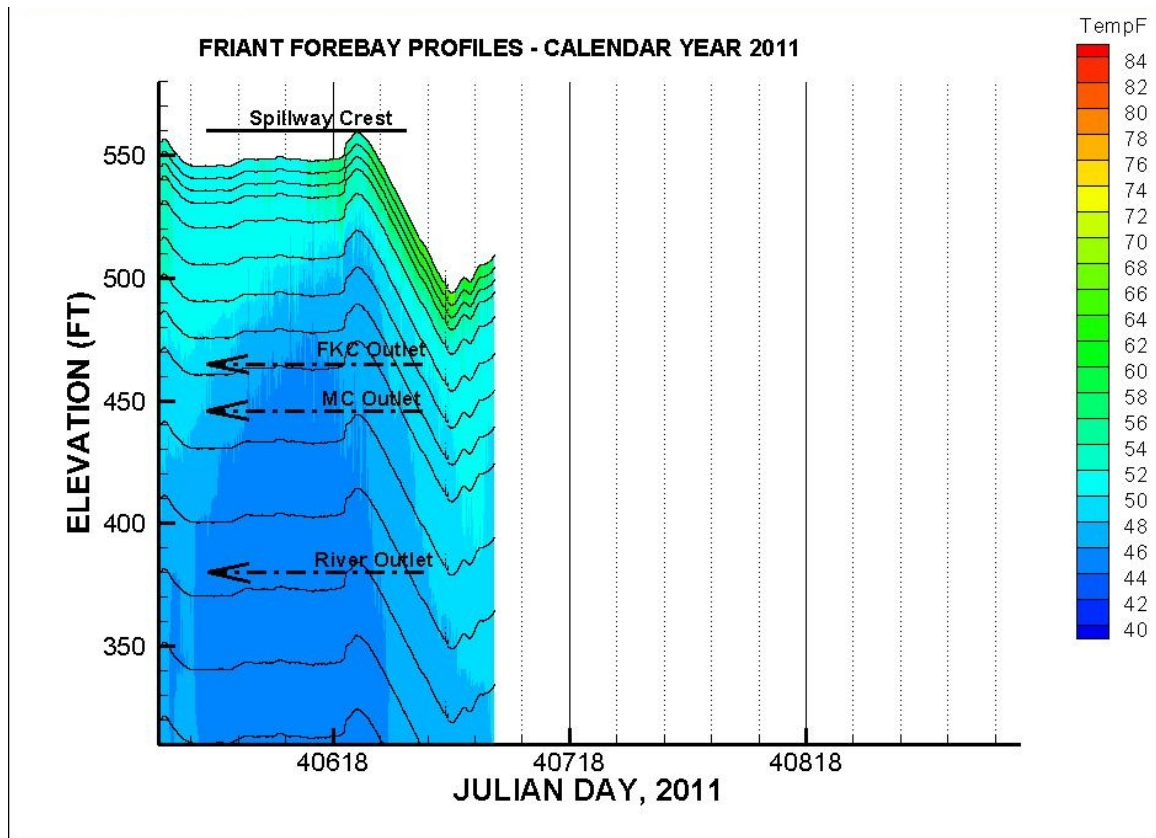
21

## 22 **2.4 Temperature**

23 Reclamation continued to collect temperature data at several Millerton Lake locations  
24 during 2011. **Figure 2-3** below displays January 1- May 23, 2011 temperature profile  
25 results from the monitoring string deployed upstream from Friant Dam. The  
26 **Temperature Monitoring Atlas** attached to **Appendix D** includes metadata and results  
27 from this study.

1

**Figure 2-3. 2011 Friant Dam Forebay Temperature Profiles**



2

3

Note: Figure 2-3 displays data from January 1- May 23, 2011.

4

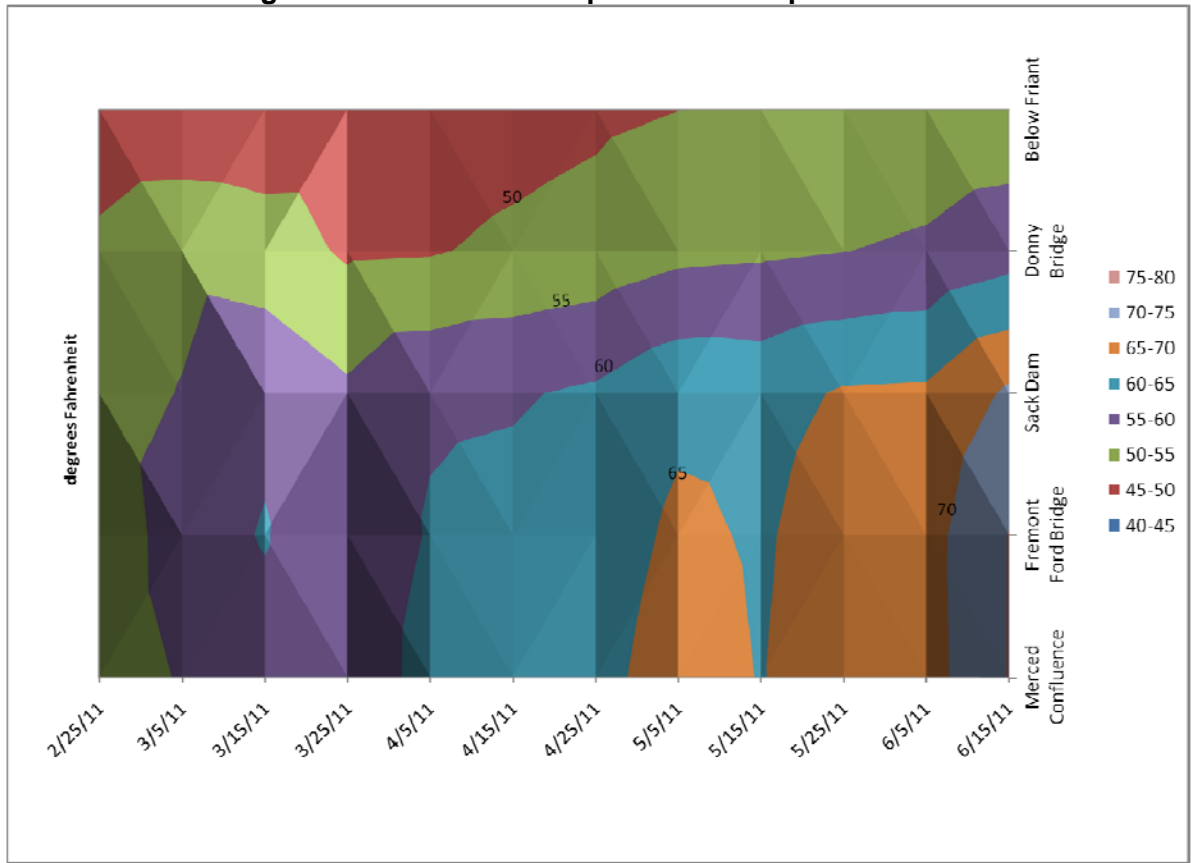
5

The California Department of Fish and Game (CDFG) continued to manage a network of temperature sensors in Reaches 1 – 5 during 2011 to support fisheries studies.

6

1

**Figure 2-4. 2011 San Joaquin River Temperatures**



2

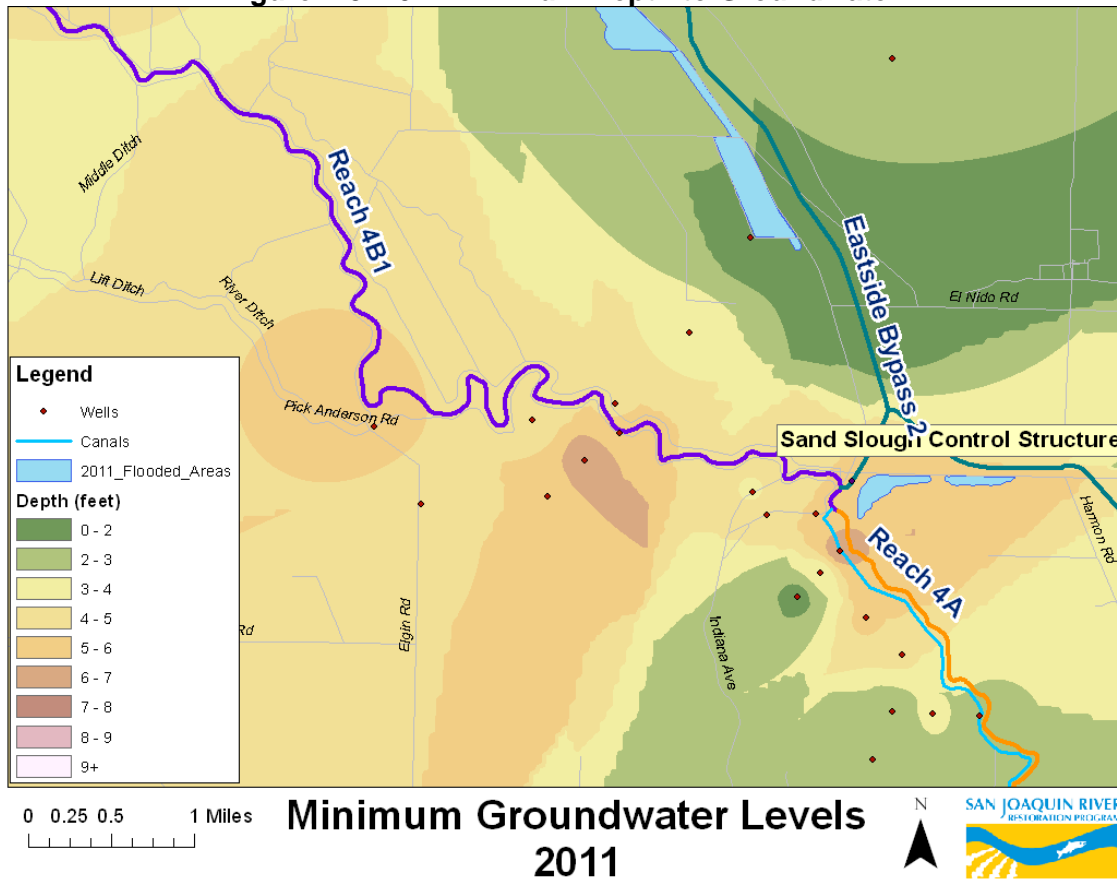
### 3 **2.5 Groundwater**

4 SJRRP continued to monitor groundwater consistent with the Seepage Monitoring and  
 5 Management Plan. The SJRRP monitoring well network includes 123 wells installed by  
 6 the Program as well as data provided by the Central California Irrigation District to  
 7 produce a single atlas that reports groundwater levels for 245 wells (refer to the  
 8 **Monitoring Well Atlas**).

9 2011 flood control releases from Friant Dam allowed for collection of groundwater data  
 10 during high flows to inform the seepage project process. **Figure 2-5** displays minimum  
 11 groundwater depths near Reach 4A. **Appendix G** includes a compilation of seepage data,  
 12 including a monitoring well atlas, a record of hotline calls, daily seepage evaluations, and  
 13 flow bench evaluations.

1

**Figure 2-5. 2011 Minimum Depth to Groundwater**



2

3 A Baseline Soil Salinity Report is included in **Appendix B Section 18**.

4 **2.6 Water Quality**

5 SJRRP continued to monitor water quality consistent with the Water Quality Monitoring  
 6 Plan. **Appendix D** is a summary of available data collected during 2011.

7 **2.7 Sediment**

8 Sediment samples are currently being processed in the USGS sediment lab.

9 DWR bed mobility and bed profile data are available in **Appendix E**.

10 **2.8 Fisheries**

11 The Fisheries Management Plan describes life-history strategies and requirements within  
 12 each stage for both spring and fall-run Chinook salmon. Multiple SJRRP studies are  
 13 underway to collect data regarding fish needs.

1 **2.8.1 Juvenile Salmonid Survival and Migration**

2 USFWS has provided a preliminary report in **Appendix B Section 2.0.**

3 **2.8.2 Spawning Environment (in the Hyporheic Zone)**

4 Preliminary results were released in the 2010 ATR; reporting is still in progress. The  
5 Implementing Agencies are preparing related proposals for the 2011 Monitoring and  
6 Analysis Plan.

7 **2.8.3 Hills Ferry Barrier Evaluation**

8 A report is currently in administrative review.

9 **Figure 2-6 Hills Ferry Barrier and fish trap**



10

11 **2.8.4 Fish Passage Evaluation**

12 The Department of Water Resources (DWR) conducted Fish Passage Evaluations along  
13 the San Joaquin River and flood bypasses from Friant Dam to the Merced River  
14 confluence to identify passage impediments to migration of juvenile and adult salmon  
15 and other native fish. Please refer to both **Appendix B Section 16**, and the **Fish Passage**  
16 **Evaluation TM.**

17 **2.8.5 Habitat Mapping**

18 The Department of Fish and Game (DFG) plans to resume habitat mapping have been  
19 delayed due to flood control releases. Mapping will continue during summer and fall  
20 2011.

1 **2.8.6 Reach 1A Bed Mobility**

2 Refer to Appendix B for information about Bed Mobility.

3 **2.8.7 Benthic Macroinvertebrate Bioassessment**

4 DWR and DFG plan to resume benthic macroinvertebrate bioassessment throughout the  
5 San Joaquin River Restoration Area from July until September 2011. Benthic  
6 macroinvertebrate communities are both bioindicators of stream condition and a food  
7 resource for fish. This multi-year study depends on the existence of base flows and  
8 wadeable conditions at sampling locations. A progress report is forthcoming pending  
9 taxonomic analysis by California's Surface Water Ambient Monitoring Program  
10 (SWAMP).

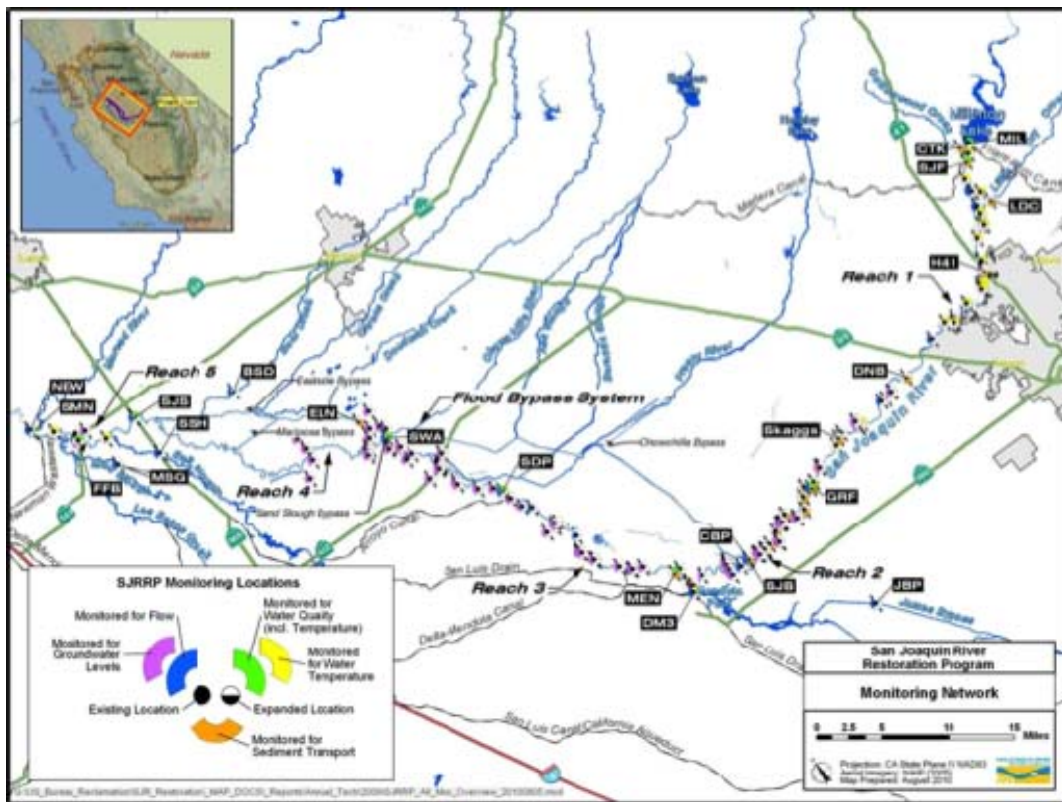
# 3.0 Monitoring Network

SJRRP continues to maintain and upgrade a multi-parameter monitoring network to collect relevant data during Interim Flows as required by the Settlement. Management of the network is based on monitoring and management plans (Appendix I), permit requirements, and environmental documents.

Please refer to the data appendixes of this ATR to access metadata, data, and web links to data sets produced by the monitoring network.

SJRRP is developing atlases as another tool to manage increasing metadata and data sets. Groundwater and Temperature atlases are currently available at [www.restoresjr.net](http://www.restoresjr.net). Flow/Stage and Aerial Imagery atlases are currently under development.

Figure 3-1 Monitoring Locations in Reaches 1-5



12

### 1 **3.1 Water Surface Elevations and Discharge Measurements**

2 The Department of Water Resources (DWR) continued several monitoring efforts during  
3 the first half of 2011 in support of the Channel Capacity Problem Statement. Monitoring  
4 occurred during early January, late March through early April, and early May. Please  
5 refer to the Water Surface Elevation Report and Discharge Measurements Report for  
6 information on timings, locations, and flows for the measurements.

7 DWR conducted water surface profile surveys at an average spacing of approximately  
8 0.5-miles in Reaches 1A, 1B, 2A, 3, 4A, the Chowchilla Bypass, and the Eastside  
9 Bypass, as well as discharge measurements throughout the restoration reaches. Water  
10 levels were recorded at the top and bottom of hydraulic controls, upstream, at, and  
11 downstream of discharge sites, and at very half foot of drop. The number, spacing, and  
12 exact location of the points were prioritized based on hydraulic conditions, resources,  
13 access, and GPS coverage.

14 During the April 1<sup>st</sup> survey in Reach 2A there was a noticeable gap in the data from river  
15 mile 226.0 to river mile 223.6. There appears to be poor cell coverage in this area, which  
16 prohibits the survey rover from receiving corrections. To correct this, for the May 2011  
17 run, a base with radio transmitter was setup at Gravelly Ford.

18 During the April 12<sup>th</sup> survey in Reach 4A, a Price-type AA current meter was used to  
19 measure the velocity at Hwy 152.

### 20 **3.2 Water Level Recorders**

21 DWR installed six additional water level recorders (WLRs) at key locations in Reaches  
22 1A and 1B from September 2009 through January 2010 in order to provide additional  
23 data to calibrate the hydraulic and flow-routing models (see 2009 ATR for more  
24 information). Water stage data are being collected by the recorders at 15 minute intervals  
25 and saved in the data logger from the date of installation. These data are periodically  
26 downloaded and processed for reporting.

### 27 **3.3 Monitoring Cross Sections**

28 DWR collected Monitoring Cross Section surveys at two sites in reach 1B, 12 sites in  
29 reach 2A, and 1 site in reach 2B in February 2011. The surveys were conducted after the  
30 Friant Scheduled Release of 6,000cfs had abated. Additional surveys are required after  
31 Friant scheduled releases were increased to 7,500cfs in March 2011. Friant releases since  
32 the scheduled release of 7,500cfs have not receded sufficiently to re-survey the sites  
33 before June 2011.

34 DWR collected bed material samples in February 2011 during topographic surveys after  
35 the scheduled flood flow release of 6,000cfs from Friant Dam (see above).

1 **3.4 Scour Chains**

2 DWR monitored scour chains and conducted bed profile surveys during five interim flow  
 3 release benches from Friant Dam that ranged from 800 to 1,550cfs in 2010 at two  
 4 selected sites in Reach 2A (M6.5 and M10). These data were reported in 2010 ATR. In  
 5 January 2011, a bed profile survey was performed only at M6.5 during the scheduled  
 6 flood flow release of 6,000cfs from Friant Dam.

7 Four scour chains at each site were installed in fall 2009 and monitored after each  
 8 seasonal interim flow release. The selected sites have been visited and changes recorded  
 9 after each seasonal flow release from Friant Dam since fall 2009 flows began. Data  
 10 collection from the chain sites was not performed in 2011 due to continuous higher flows  
 11 in the channel bed.

12 **3.5 2011 Bathymetric and Water Surface Profile Surveys**

13 In January and April 2011, Reclamation collected bathymetric surveys and water surface  
 14 profiles along San Joaquin River and bypasses during flood release conditions (see **Table**  
 15 **2-2**). In January 2011, surveys were conducted in a portion of Reach 4A along the San  
 16 Joaquin River from HW 152 to the Sand Slough Control Structure, along the Eastside  
 17 Bypass from the Sand Slough control structure to the confluence with the San Joaquin  
 18 River at Reach 5, and in a portion of Reach 5 from the confluence with the Eastside  
 19 Bypass/Bear Creek to HW 140. Surveys were conducted between January 17<sup>th</sup> and  
 20 January 21<sup>st</sup>. In April 2011, surveys were conducted from April 7<sup>th</sup> to April 12<sup>th</sup>.  
 21 Bathymetric and water surface elevation data were collected along the San Joaquin River  
 22 in Reaches 4B2 and Reach 5, from the confluence with the Mariposa Bypass to the  
 23 confluence with the Merced River.

24 Data collected provide bed elevations and water surface elevations for use in monitoring  
 25 and modeling efforts. The bathymetric data collected as part of this investigation will be  
 26 combined with existing LiDAR to develop complete surface models of the San Joaquin  
 27 River Restoration Program Area.

28 **Table 2-2 2011 Reclamation Bathymetric and Water Surface Profile Surveys**

Date of Survey	Reach Surveyed
17-Jan-11	Reach 4A from Hwy 152 Bridge to Sand Slough (2 passes)/Eastside Bypass to Chowchilla Bypass/Chowchilla Bypass from Washington Road Bridge to Eastside Bypass
18-Jan-11	Chowchilla Bypass from Washington Road Bridge to Eastside Bypass/Eastside Bypass from Sand Slough to Dan McNamara Road
19-Jan-11	Eastside Bypass from Dan McNamara Road to upstream end of Reach 5 (MP 135.8)/Reach 5 from upstream end (MP 135.8) to Hwy 140 Bridge/Reach 4B2 from low water crossing (MP 141.3) to upstream end of Reach 5 (MP 135.8) (2 passes)
20-Jan-11	Eastside Bypass from Dan McNamara Road to upstream end of Reach 5 (MP 135.8)/Reach 5 from upstream end (MP 135.8) to Hwy 140 Bridge

Date of Survey	Reach Surveyed
21-Jan-11	Eastside Bypass from Dan McNamara Road to upstream end of Reach 5 (MP 135.8)/Reach 5 from upstream end (MP 135.8) to Hwy 140 Bridge
7-Apr-11	Reach 4B2 from downstream Mariposa Bypass control structure to upstream end of Reach 5 (MP 135.8)
8-Apr-11	Reach 4B2 from downstream Mariposa Bypass control structure to upstream end of Reach 5 (MP 135.8)
9-Apr-11	Reach 5 from Hwy 140 Bridge to Merced River confluence
10-Apr-11	Reach 5 from upstream end (MP 138.5) to Hwy 140 Bridge
11-Apr-11	Reach 5 from Hwy 140 Bridge to Merced River confluence
12-Apr-11	Reach 5 from Hwy 140 Bridge to Merced River confluence

1

## 2 3.6 Water Quality

3 The program is based on a series of 23 stations along the river and its major tributaries  
4 that provide real-time measurements of physical parameters (flow, stage/depth,  
5 temperature, salinity, DO, etc.). The raw data are posted on the California Data  
6 Exchange network: <http://cdec.water.ca.gov/queryQuick.html>. A graphic that summarizes  
7 current conditions at these stations is located here:  
8 <http://www.restoresjr.net/flows/Water%20Quality/index.html>

9 Reclamation collected grab samples of water each month from nine places along the  
10 river. Each sample was tested for total suspended solids, nutrients, total and dissolved  
11 carbon, bacteria, cations, anions, and trace elements. In April 2011, special samples were  
12 collected for the measurement of organochlorine, carbamates, pyrethroids, and  
13 organophosphate pesticides.

14 No sediment samples were collected in 2011. Reclamation plans to do so in October  
15 2011.

16 Winter rainstorms caused local flooding from various tributaries. Reclamation collected  
17 special samples in March of floodwater from Panoche Creek that entered the Mendota  
18 Pool.

## 19 3.7 Sediment

20 SJRRP collected sediment data for channel capacity and fisheries studies. During March-  
21 May 2010 USGS collected suspended sediment, bedload, discharge, and bed material  
22 data eight times at five locations: Highway 41, Skaggs Bridge, Gravelly Ford,  
23 Chowchilla Bifurcation Structure, and below Mendota Dam (**Table 2-3**).

1

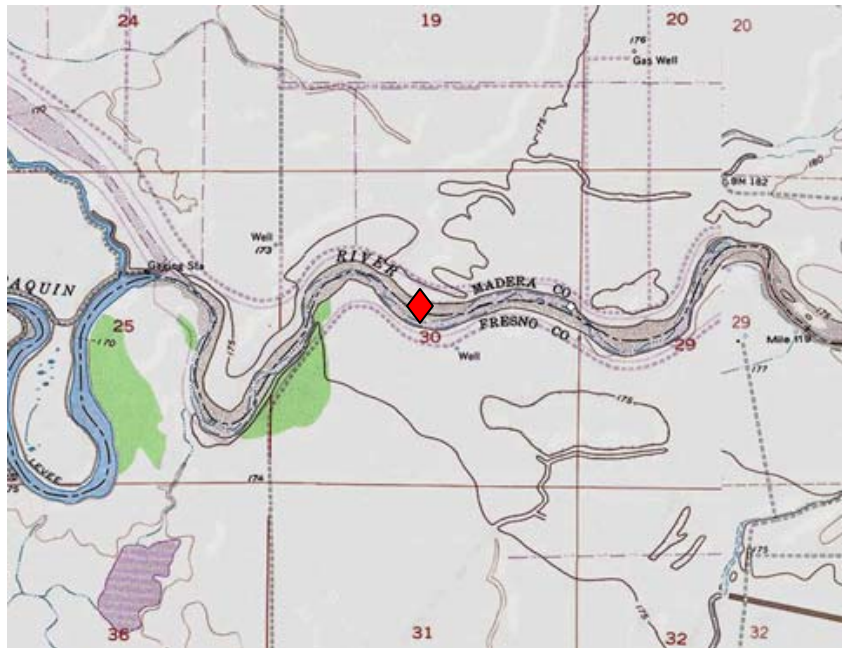
**Table 2-3 2011 USGS Sediment Sampling Dates**

Sample	Week	Friant Dam Release (cfs)
1	March 14	700
2	March 28	6655
3	April 11	6549
4	April 18	6578
5	April 25	6077
6	May 9	3599
7	May 23	2917
8	June 6	2560

2

3 During 2011 flood control operations led to most of the San Joaquin River flows being  
 4 routed down the Chowchilla Bypass, which prompted discussions about monitoring  
 5 sediment above the Chowchilla Bifurcation Structure. USGS sampled at the location  
 6 displayed in **Figure 2-5** below for samples 7 and 8.

7 **Figure 2-5 USGS Sediment Sampling Location Upstream of Chowchilla Bifurcation**  
 8 **Structure**



9

### 10 **3.8 Aerial Imagery**

11 SJRRP has completed 2 of 3 planned aerial flights during 2011 to collect 2-foot color-  
 12 infrared imagery of the Restoration Area. Unlike 2010, these flights also include the  
 13 Chowchilla Bypass. The flights acquired information for fisheries inundation studies at  
 14 different flow rates (see **Table 2-3**).

1 **Table 2-4. San Joaquin River Flows (cfs) on 2011 Aerial Flight Dates**

2

Flight	Date	Friant Dam	Donny Bridge	Skaggs Bridge	Gravelly Ford	Bifurcation	Chowchilla Bypass	Sack Dam
1	4/27/2011	5,301	No data	5,691	5,672	495	4,900	2,900
2	6/2/2011	2,900			2,729	1,362	1,144	10
3	To be completed.							
	<b>QA/QC data bold.</b>							
	<i>CDEC data italics.</i>							

3 Key

4 cfs = cubic feet per second

5

# 1 4.0 Models and Analytical Tools

2 Modeling provides a means for SJRRP to predict or extrapolate in order to formulate  
 3 operations and other implementation activities. **Table 4-1** summarizes analytical tools  
 4 currently available to SJRRP.

5 **Table 4-1. Analytical Tools for SJRRP**

Model	Type	Purpose	Status	Model Application
HEC-RAS	Hydraulic (1D)	Water surface (Inundation mapping)		Terrain updates
SRH-2D	Hydraulic	Depth/velocity/habitat mapping		
SRH-2D	Sediment	Transport/habitat mapping		
SRH-2D	Temperature	Habitat mapping		
SRH-1D	1D mobile boundary sediment	Transport		Update based on new terrain data.
HEC-5Q	1D hydraulic routing, temperature	San Joaquin River temperature		Validation using 2010 monitoring data. Modeling for proposed hydrographs to aid flow scheduling.
CE-QUAL-W2	Temperature (vertical 2D)	Millerton cold water pool	Complete	
SRH-1DV	Cross section vegetation	Vegetation response to flow and sediment conditions		Support for design work on Reach 2B and Reach 4B site-specific projects
CVHM	Groundwater	Groundwater flow	CVHM has 1-mile-square grids for Central Valley	Preliminary simulations related to Reach 2B proposed alignments right now, using current version and input from HEC-RAS model
EDT	Fisheries	Population response to habitat conditions	Under development	

6

1 **5.0 Conclusions**

2 SJRRP is continuing to monitor the San Joaquin River. The 2011 flood season provided  
3 an opportunity to collect data during higher flows than possible under Interim Flows.

4

5

## 1 **6.0 References**

- 2 Central Valley Operations Office (CVOO). 2010. 2009 Reservoir Operations Reports.  
3 Available at < [http://www.usbr.gov/mp/cvo/rpt\\_09.html](http://www.usbr.gov/mp/cvo/rpt_09.html)>.
- 4 San Joaquin River Restoration Program (SJRRP). 2009a. Draft Fisheries Management  
5 Plan: A Framework for Adaptive Management in the San Joaquin River  
6 Restoration Program. Available at <<http://restoresjr.net/>>.
- 7 San Joaquin River Restoration Program (SJRRP). 2009b. Draft Seepage Management  
8 Plan.
- 9 San Joaquin River Restoration Program (SJRRP). 2011. Restoration Flow Guidelines.