

Final 2011 Agency Plan

SAN JOAQUIN RIVER
RESTORATION PROGRAM

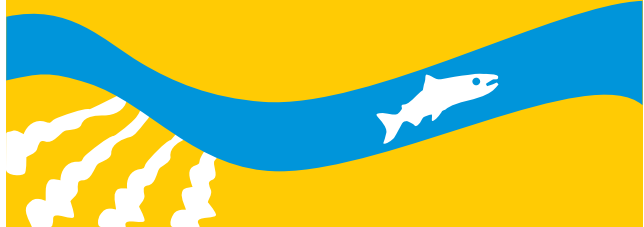


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Abbreviations and Acronyms

Act	San Joaquin River Restoration Settlement Act
ATR	Annual Technical Report
DFG	California Department of Fish and Game
DWR	California Department of Water Resources
EA	Environmental Assessment
ESA	Endangered Species Act
FMP	Fisheries Management Plan
IS	Initial Study
MMP	Monitoring and Management Plan
NMFS	National Marine Fisheries Service
Order	State Water Resources Control Board Water Right Order 1009-0058-DWR
RA	Restoration Administrator
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RFG	Restoration Flow Guidelines
Settlement	Stipulation of Settlement in <i>NRDC, et al., v. Kirk Rodgers, et al.</i>
SEA	Supplemental Environmental Assessment
SJRRP	San Joaquin River Restoration Program
SMN	San Joaquin River Near Newman
State Board	State Water Resources Control Board
USFWS	U.S. Fish and Wildlife Service
WY	water year

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1.0 Introduction

The San Joaquin River Restoration Program (SJRRP) planning and reporting process is designed to meet and adapt to the needs of multiple audiences through annual production of an Agency Plan and an Annual Technical Report (ATR). The ATR reports monitoring and analysis results, and synthesizes agency proposals, Restoration Administrator (RA) recommendations, and other input into Problem Statements and supporting Information Needs consistent with the Stipulation of Settlement in *NRDC, et al., v. Kirk Rodgers, et al.* (Settlement) and Public Law 111-11. Problem Statements represent the Agencies' approach to implementing SJRRP, and Information Needs lead to development of specific tools aiding flow scheduling and other management activities that support Restoration and Water Management goals.

This Agency Plan presents Studies designed by the Agencies to manage Interim Flows for the next year of the SJRRP. Studies describe tasks to be implemented by the Agencies to address one or more Information Needs, and address requirements from multiple sources, including the RA recommendations, Restoration Flow Guidelines (RFG), Water Year (WY) 2011 Interim Flows Supplemental Environmental Assessment (SEA), Water Rights Order 2009-058-DWR (Order), Order 2010-029-DWR, and any additional stipulations for WY 2011, existing operations agreements, and the Draft Fisheries Management Plan (FMP) (SJRRP 2009).

The Agencies responsible for implementing the SJRRP include the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and U.S. Fish and Wildlife Service (USFWS), the California Natural Resources Agency, Department of Water Resources (DWR), and Department of Fish and Game (DFG), and U.S. Department of Commerce, National Marine Fisheries Service (NMFS).

The Agency Plan is one component of the SJRRP planning and reporting process displayed in Figure 1-1 and is also presented in the RFG. Figure 1-1 describes an annual process to develop the Agency Plan, solicit feedback from the RA, implement monitoring programs for the SJRRP, and report results.

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

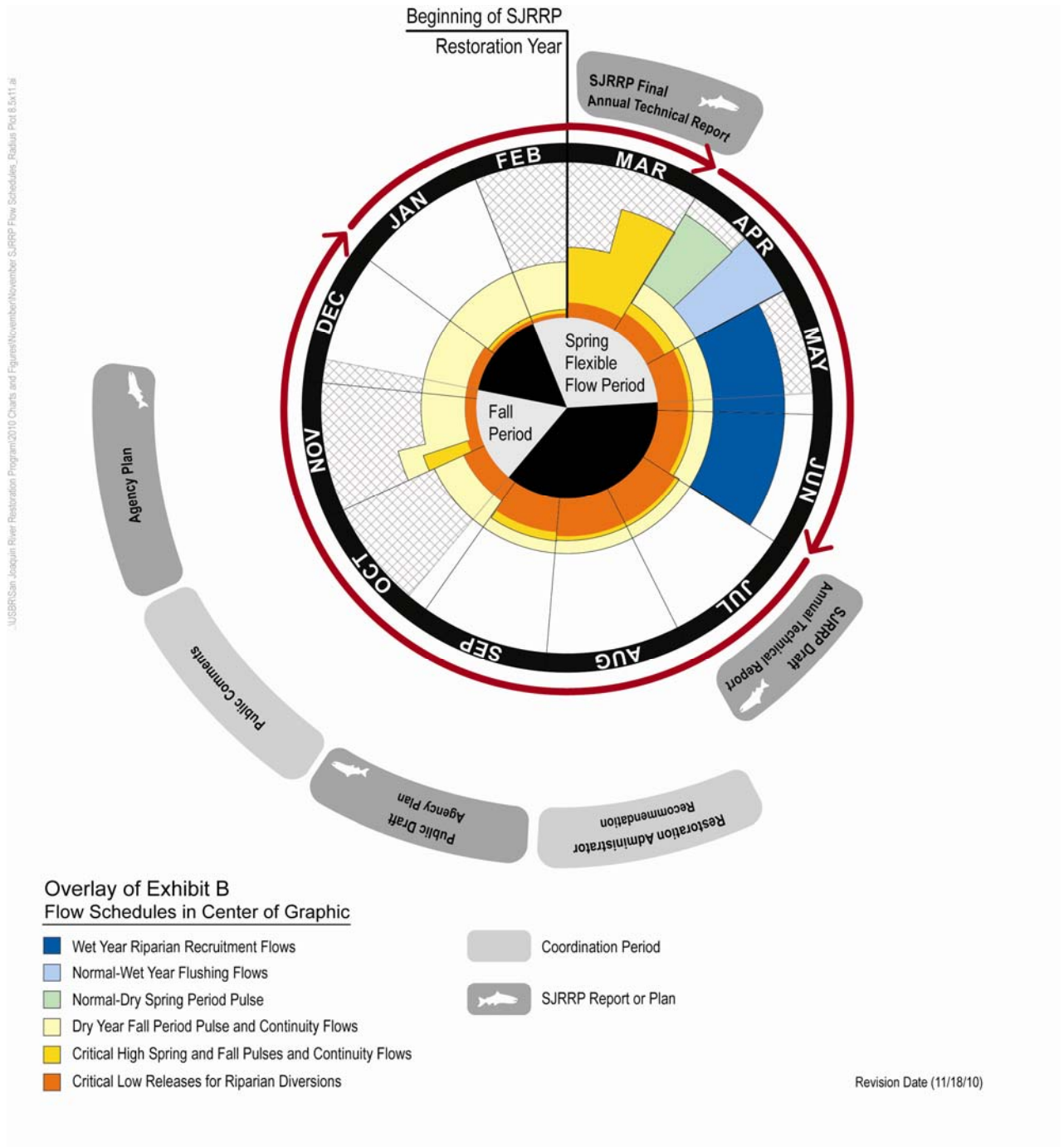


Figure 1-1. Monitoring and Reporting Schedule

1.1 Report Organization

The main body of the text summarizes future monitoring activities and the current state of analyses. Organization of this plan is briefly described below.

Section 1.0 Introduction – Purpose and structure of the Agency Plan for 2011.

Section 2.0 Background – Description of sources for monitoring and analysis planning.

Section 3.0 Monitoring Network – Type, location, and dates of sensors, surveys, or equipment.

Section 4.0 Analytical Toolkit – Type, spatial extent, and scope or model development and implementation.

Section 5.0 Studies – Key questions and activities to address information needs identified for the SJRRP, improve assumptions, and form the basis for new or continued monitoring plans in subsequent years.

Section 6.0 Summary – Summary of how plan meets requirements and addresses concerns outlined in introduction.

Section 7.0 References – References for sources of information used to compile this plan.

Appendix A Study Plans – Plans for active studies during WY 2011 Interim Flows.

Appendix B Atlases – Monitoring location summary maps for sensors and surveys, and atlases by monitoring component.

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2.0 Background

The Agency Plan integrates monitoring and analysis requirements for the SJRRP, including RA recommendations, RFG, ATR, FMP, WY 2010 Interim Flows Project Environmental Assessment/Initial Study, and WY 2011 Interim Flows Project Supplemental Environmental Assessment.

2.1 SJRRP Restoration Administrator Recommendations

SJRRP RA recommendations for the flow period of February 1, 2010, through December 1, 2010, consisted of the following components:

- Streamflow monitoring recorded at 15-minute intervals for recommended sites (Reaches 1 – 5)
- Water temperature monitoring, including a recommended list of thermistor locations (Reaches 1 – 5)
- Flow versus fish habitat assessment (Reaches 1 – 5)
- Hydraulic monitoring for adult Chinook salmon passage assessment (Reaches 1 – 5)
- Flow accretions/losses monitoring (Reaches 1B, 2, and 4A, and bypasses)
- Seepage monitoring (Reaches 2, 3, and 4A)
- Shallow groundwater monitoring (Reaches 2, 3, and 4A)
- Fine and coarse sediment transport monitoring (Reach 1A)
- Water surface elevation monitoring (Reaches 1 – 5)

Future RA recommendations may result in amendments or subsequent attachments to the Agency Plan.

2.2 Flow Guidelines

The Settlement requires a flow monitoring program that monitors the daily volume and rate of flow at no less than six stations within the Restoration Area, including the following:

- At or immediately below Friant Dam
- At Gravelly Ford

- Below the Chowchilla Bypass Bifurcation Structure
- Below Sack Dam
- At the head of Reach 4B
- At the San Joaquin River and Merced River confluence

An additional site, not specified as a compliance location by the Settlement, is included at the head of the Sand Slough Bypass.

2.3 Fisheries Management Plan

The Draft FMP (June 2009) sets the foundation for an adaptive management approach and identifies program goals and quantitative objectives to achieve the Settlement Restoration Goal. The Draft FMP is the basis for fisheries information included in the ATR.

2.4 Water Years 2010 and 2011 Interim Flows Environmental Assessments

The WY 2010 Interim Flows Project includes monitoring and analysis requirements, in the form of Monitoring and Management Plans (MMP) appended to the WY 2010 Interim Flows Project Environmental Assessment/Initial Study (EA/IS). WY 2011 Interim Flows are currently addressed in a Draft Supplemental EA (SEA). The WY 2011 Interim Flows Project SEA includes the same requirements in the project description and mitigation measure as for the WY 2010 Interim Flows Project EA/IS.

As mentioned, MMPs are appended to the WY 2010 Interim Flows EA/IS, and include seepage, flow, and invasive species MMPs. A fourth monitoring plan requirement, the Water Quality Monitoring and Quality Assurance Plan, is also included in the project description. This requirement states that Reclamation would complete and submit a water quality plan for flows through December 31, 2013. The MMPs and Water Quality Monitoring and Quality Assurance Plan identify the appropriate timing, scope of monitoring, and reporting methodology, and the agency/agencies responsible for implementing the plans.

The WY 2011 Interim Flows Project Biological Assessment Errata state that Reclamation will develop a monitoring plan, in coordination with the SJRRP Fisheries Management Work Group, to check for Central Valley steelhead in the Restoration Area during spring Interim Flows, and submit this plan to NMFS before February 1, 2011. The plan will include notifying NMFS if a steelhead is encountered in the Restoration Area, and also include recovery and return of stranded steelhead downstream in an appropriate location designated by DFG and/or NMFS. Such recovery would be conducted under and consistent with DFG's Endangered Species Act (ESA) Section 4(d) research permit.

2.5 State Water Resources Control Board Water Rights Orders

On October 1, 2009, the State Water Resources Control Board (State Board) issued Order 2009-058-DWR for the WY 2010 Interim Flows Project. Order 2009-058-DWR requires explicit monitoring during implementation of WY 2010 Interim Flows. These requirements include monitoring of flow, water quality, seepage, and invasive species, consistent with the MMPs and the Water Quality Monitoring and Quality Assurance Plan identified in the WY 2010 Interim Flows Project EA/IS (Reclamation 2009). Order 2009-058-DWR further requires monitoring of water quality and sediments at several locations along the river, beginning in fall 2009. Order 2009-058-DWR requires Reclamation to develop a monitoring plan, acceptable to the Deputy Director for Water Rights, for releases beginning after February 1, 2010.

Reclamation developed the 2009 – 2013 Interim Flow Release Program Water Quality Monitoring Plan in January 2010, in part to meet the water quality and bed sediment monitoring requirements of Order 2009-058-DWR. According to the plan, the core of SJRRP monitoring includes a series of sensors along the river that will make continuous measurements of physical conditions, including flow, depth, temperature, specific conductance (salinity), pH, dissolved oxygen, turbidity, and chlorophyll. Raw data are posted by the California Data Exchange Center (CDEC) (www.cdec.water.ca.gov) and linked to the SJRRP Web site.

On September 30, 2010, the State Board issued an Order for the WY 2011 Interim Flows Project. Order 2010-029-DWR states that Reclamation is required to continue implementing the 2009 – 2013 Interim Flow Release Program Water Quality Monitoring Plan and a water quality response plan. Order 2010-029-DWR requires Reclamation to submit requests to modify the Interim Flow Release Program Water Quality Monitoring Plan in writing to the Deputy Director for Water Rights; modifications may only be made upon written approval of the Deputy Director for Water Rights. Order 2010-029-DWR requires Reclamation to develop and submit to the Deputy Director for Water Rights, by February 1, 2011, a water quality response plan to address the following: (1) contribution of Interim Flows to high salinity conditions in the Delta-Mendota Canal, Mendota Pool, and Fresno Slough, (2) an identification of the different entities and individuals who may contribute to or play a role in the response to high salinity conditions, (3) the current legal and contractual roles and responsibilities of those entities, and (4) possible mechanisms, including those under the control of Reclamation and those that are the responsibility of other entities and individuals. Order 2010-029-DWR also states that Reclamation is required to implement monitoring of temperature changes in Millerton Reservoir and to implement a schedule for ramping of flow releases, consistent with the Settlement.

2.6 SJRRP Operations Agreements

SJRRP operations agreements are under development to identify how to operate structures under different flow releases. These agreements include installation of a stream gaging station at San Mateo Avenue.

3.0 Monitoring Network

The objective of establishing a comprehensive monitoring network is focused on addressing information needs for SJRRP implementation. The SJRRP monitoring network includes current sensors (Table 3-1 and Table 3-2) and surveys (Table 3-3) available to address information needs. The evolving information needs of the SJRRP lead to continuous refinement of the monitoring network's sufficiency, and the necessity of continued data collection at specific locations.

Data collected from the monitoring network will be presented in the ATR on an annual basis. Real-time data available from flow gage stations are available through CDEC and can be accessed through links on the SJRRP Web site (<http://restoresjr.net>). Groundwater levels from select wells and water quality measurements from telemetered stations are also available in real-time and are accessible on the SJRRP Web site. The data collected from the SJRRP monitoring network will be analyzed in studies to support SJRRP implementation and management actions. Additional information regarding the surveys that will take place in the spring is presented in Attachments 1 and 2. Appendix B presents maps, by physical monitoring parameters, which illustrate the SJRRP monitoring network currently in place, but do not include monitoring sites where equipment may be installed in the next year. Figure 3-1 provides an overview of all the locations presented in Appendix B.

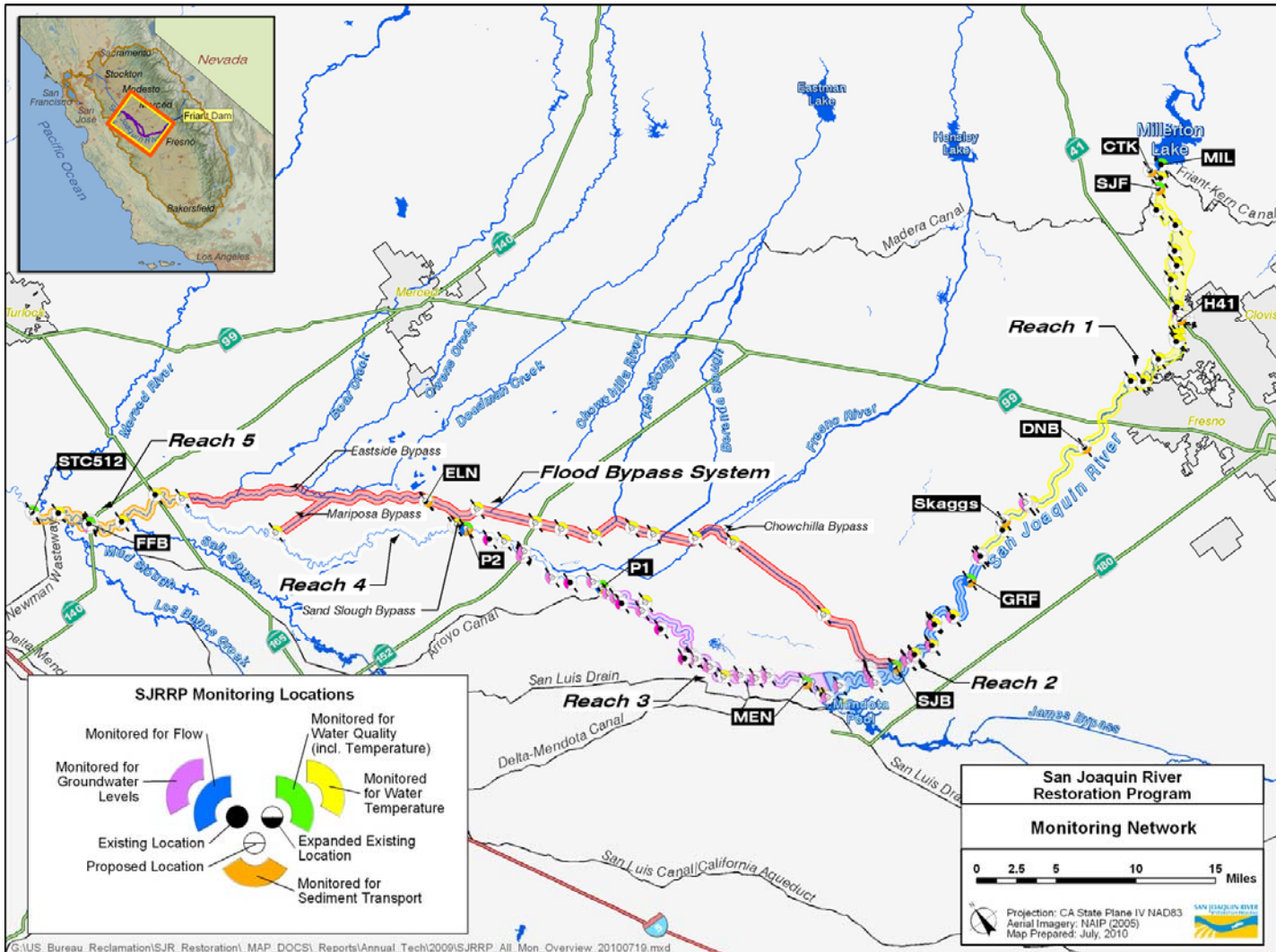


Figure 3-1. Monitoring Network Overview

Table 3-1. Monitoring Network Sensors

Sensor Type	Sensor Name	River Mile	Time Step	Agency	Notes
Stage	Friant Dam (MIL)	267.7	15-minute	Reclamation	
	Cottonwood Creek (CTK)	267.4	1-hour	Reclamation	
	Below Friant Dam (SJF)	266	15-minute	USGS	
	Head Ledger Island	263.4	15-minute	DWR	Temporary water level recorder
	Willow Unit Grade Control	261.5	15-minute	DWR	Temporary water level recorder
	Little Dry Creek (LDC)	260.6	1-hour	Reclamation	
	Rank Island (Main Channel)		Approximately monthly (manual measurement location)	Reclamation	Staff gage
	Rank Island (Above G.C. Intakes)		Approximately monthly (manual measurement location)	Reclamation	Staff gage
	Coombs- Arnold Channel		Approximately monthly (manual measurement location)	Reclamation	Staff gage
	Rank Island Grade Control	260.4	15-minute	DWR	Temporary water level recorder
	SR Highway 41 (H41)	255.1	15-minute	Reclamation	Telemetered stage data; no rating curve developed,
	Sycamore Island Flow Split	251.1	15-minute	DWR	Temporary water level recorder
	Milburn Unit	248.8	15-minute	DWR	Temporary water level recorder
	Donny Bridge (DNB)	240.7	15-minute	Reclamation	Road 32
	R 1B-1_RM 237.7	237.7	15-minute	DWR	Temporary water level recorder
	Skaggs Bridge	232.1			Rating curve, no telemetry
	Gravelly Ford (GRF)	227.6	15-minute	Reclamation	
	SG-1	223.8	1-hour; reported twice per year	Reclamation	Staff gages, Shields Avenue
	SG-2	222.1	1-hour; reported twice per year	Reclamation	Staff gages
	SG-3, SG-4, SG-5	219.8	1-hour; reported twice per year	Reclamation	Staff gages
	SG-6, SG-7, SG-8, SG-9, SG-10	218.2	1-hour; reported twice per year	Reclamation	Staff gages
	SG-10	217.2	1-hour; reported twice per year	Reclamation	Staff gages
	Chowchilla Bypass (CBP)	216	15-minute	SLDMWA	
Below bifurcation (SJB)	216.0	15-minute	Reclamation		

Table 3-1. Monitoring Network Sensors (contd.)

Sensor Type	Sensor Name	River Mile	Time Step	Agency	Notes
Stage (continued)	SG-13	211.8	1-hour; reported twice per year	Reclamation	Staff gages
	James Bypass (JBP)	NA	1-hour	SLDMWA	
	San Mateo	211.8	1-hour; reported twice per year; 15-minute	Reclamation staff gage; future USGS stream gage	Currently, a staff gage exists here; a new gaging station will be installed in 2011
	DM3	267.6	15-minute	Reclamation	Delta-Mendota Canal Check 21; DM3 stage equals elevation of Mendota Pool
	Near Mendota (MEN)	202.1	15-minute	USGS	
	Near Dos Palos (SDP)	181.5	15-minute	DWR	Sack Dam flows
	SR 152 Bridge	173.9	1-hour; reported twice per year	Reclamation	Staff gage
	Washington Road (SWA)	168.4	15-minute	DWR	Station moved during fall 2010 to former USGS gaging site upstream from Sand Slough Control Structure
	Eastside Bypass downstream from Mariposa Bypass	146	1-hour; reported twice per year	Reclamation	Staff gage
	Bear Creek (BSD)	NA	15-minute	DWR	No rating curve
	Stevinson (SJS)	132.8	1-hour	DWR	
	Salt Slough (SSH)	NA	15-minute	USGS	
	Fremont Ford Bridge (FFB)	125.1	15-minute	USGS	
	Mud Slough (MSG)	NA	15-minute	USGS	
	Near Newman (SMN)	118.4	15-minute	USGS	

Table 3-1. Monitoring Network Sensors (contd.)

Sensor Type	Sensor Name	River Mile	Time Step	Agency	Notes
Temperature	Kerckhoff No. 2 Power Plant	NA	15-minute; reported twice per year	Reclamation	Millerton inflows
	Forebay temperature string	NA	1-hour; reported twice per year	Reclamation	15 loggers upstream from Friant Dam
	River outlet works	267.5	1-hour; reported twice per year	Reclamation	San Joaquin River outflows
	Friant-Kern Canal	NA	1-hour; reported twice per year	Reclamation	Canal outflows
	Madera Canal	NA	1-hour; reported twice per year	Reclamation	Canal outflows
	SJRFP	267.7	1-hour; reported twice per year	DFG	Trench pool below Friant Dam
	Worm Farm (WF2)	266.2	1-hour; reported twice per year	Reclamation	Secondary outflow from Worm Farm
	SJRCC	267	1-hour; reported twice per year	DFG	Trench pool in Reach 1A at mouth of Cottonwood Creek
	SJRFB	266.6	1-hour; reported twice per year	DFG	Below Friant Bridge
	SJRLL	264.7	1-hour; reported twice per year	DFG	Lost Lake Park
	SJRBR1	262	1-hour; reported twice per year	DFG	Upstream from Ball Ranch
	SJRBR2	262	1-hour; reported twice per year	DFG	Upstream from Ball Ranch
	SJRWUA	260.9	1-hour; reported twice per year	DFG	Willow Unit
	SJRBB	259.5	1-hour; reported twice per year	DFG	Riverbend Golf Club
	SJRRI	259.5	1-hour; reported twice per year	DFG	Rank Island
	SJRV1	258	1-hour; reported twice per year	DFG	Holding Pond B, Reach 1A
	SJRV2	258	1-hour; reported twice per year	DFG	Holding Pond B, Reach 1A
	SJRGPA3	253.6	1-hour; reported twice per year	DFG	Downstream from H41, Gravel Pit A
	SJRGP4	253.6	1-hour; reported twice per year	DFG	Downstream from H41, Gravel Pit A
	SJRMU	247.5	1-hour; reported twice per year	DFG	Milburn Unit
SJRGF	231.2	1-hour; reported twice per year	DFG	1 mile downstream from Skaggs Park	
SG-1	223.8	1-hour; reported twice per year	Reclamation	Staff gage	

Table 3-1. Monitoring Network Sensors (contd.)

Sensor Type	Sensor Name	River Mile	Time Step	Agency	Notes
Temperature (continued)	SG-2	222.1	1-hour; reported twice per year	Reclamation	Staff gage
	SG-3, SG-4, SG-5	219.8	1-hour; reported twice per year	Reclamation	Staff gage
	SG-6, SG-7, SG-8, SG-9, SG-12	218.2	1-hour; reported twice per year	Reclamation	Staff gage
	SG-10	217.2	1-hour; reported twice per year	Reclamation	Staff gage
	SG-11	217.2	1-hour; reported twice per year	Reclamation	Staff gage
	SG-13	211.8	1-hour; reported twice per year	Reclamation	Staff gage
	SJRMP	204.5	1-hour; reported twice per year	Reclamation	Downstream from Mendota Pool
	SR 152 Bridge	173.9	1-hour; reported twice per year	Reclamation	Staff Gage
	Eastside Bypass downstream from Mariposa Bypass	146	1-hour; reported twice per year	Reclamation	Staff Gage

Table 3-2. Monitoring Network Sensors for Water Quality

Sensor Type	Sensor Name	River Mile	Constituents	Notes
Water Quality	Friant Dam (Millerton)	267.6	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Multiple-parameter sonde
	San Joaquin River below Friant Dam	266	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Multiple-parameter sonde
	San Joaquin River below Friant Dam	266	Full Title 22 organic and inorganic compounds, plus bacterial; short list of constituents for lab analysis to be determined (e.g. selenium, boron)	Autosampler grab sample
	San Joaquin River at Gravelly Ford	227.6	Temperature	Multiple-parameter sonde
	San Joaquin River below Bifurcation	216	Temperature	Multiple-parameter sonde
	San Joaquin River near Mendota	202.1	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Autosampler grab sample
	San Joaquin River below Sack Dam	181.2	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Multiple-parameter sonde
	San Joaquin River at top of Reach 4B	125.1	Electrical conductivity, temperature, dissolved oxygen, and turbidity	Uses established site at Fremont Ford
	San Joaquin River at Fremont Ford Bridge	125.1	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Multiple-parameter sonde
	San Joaquin River at Fremont Ford Bridge	125.1	Selenium, boron, nutrients (nitrate, ammonia, total Kjeldahl nitrogen, total phosphate, and ortho-phosphate), and others (bacteria, trace elements, total organic carbon, and other minerals)	Grassland Bypass Project Station H
	San Joaquin River at Hills Ferry	118.2	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Multiple-parameter sonde

Table 3-2. Monitoring Network Sensors for Water Quality (contd.)

Sensor Type	Sensor Name	River Mile	Constituents	Notes
Water Quality (contd.)	Friant Dam (Millerton)	118.2	Selenium and boron	Grassland Bypass Project Station N
	San Joaquin River at Hills Ferry	118.2	Short list of constituents for lab analysis to be determined (e.g. selenium, boron); Full Title 22 organic and inorganic compounds, plus bacteria	Autosampler grab sample
	San Joaquin River near Crows Landing	NA	Electrical conductivity, temperature, pH, dissolved oxygen, turbidity, and chlorophyll	Grassland Bypass Project Station N
	San Joaquin River near Crows Landing	NA	Selenium, boron, nutrients (nitrate, ammonia, total Kjeldahl nitrogen, total phosphate, and ortho-phosphate), and others (bacteria, trace elements, total organic carbon, and other minerals)	Autosampler grab sample

Key:

- cfs = cubic feet per second
- DFG = California Department of Fish and Game
- DWR = California Department of Water Resources
- ESB = Eastside Bypass
- NA = not applicable
- Reclamation = U.S. Department of the Interior, Bureau of Reclamation
- SLDMWA = San Luis & Delta-Mendota Water Authority
- SR = State Route
- USGS = U.S. Geological Survey

Table 3-3. Monitoring Network Surveys

Survey Type	Purpose	Status	2011 Surveys
Water Surface Profiles	Hydraulic model calibration	Reaches 1 – 3: complete for flows up to 1,500 cfs Friant release, except 350 and 700 cfs in 1B and 3. Reaches 4A, 4B2, 5, ESB: one pass completed, need additional detail	Reaches 1 – 3: complete surveys up to 1,500 cfs, survey during higher flood releases if possible. Reaches 4A, 4B2, 5, and ESB: acquire additional detail
Bathymetric	Hydraulic model calibration	Reaches 1 – 3: complete Reaches 4A, 4B2, 5, ESB: one pass completed, need additional detail	Reaches 1 – 3: none Reaches 4A, 4B2, 5, and ESB: one pass completed, need additional detail
Cross Sections	Hydraulic model calibration	2010 surveys in Reaches 1A, 2A, 2B, and 3	2011 resurveys in Reaches 1A, 2A, 2B, and 3, to capture before/after effects of spring and fall flows
Aerial	Inundation mapping, habitat assessments, vegetation mapping	Reaches 1 – 5, Eastside Bypass, Mariposa Bypass, 5 flights during spring 2010	None
Vegetation	Model calibration	October 2010 surveys in Reach 2B	Currently in planning stages
Bed Material Sampling	Hydraulic model calibration	None	Refer to Attachment 1: Reclamation Technical Services Center Monitoring Activities for Interim Flows WY 2011
Invertebrate Studies	Habitat assessment	2010 installed in Reach 1	Refer to Attachment 1: Reclamation Technical Services Center Monitoring Activities for Interim Flows WY 2011

Key:
 cfs = cubic feet per second
 ESB = Eastside Bypass

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4.0 Analytical Toolkit

Analytical tools provide a numerical representation of conceptual models. Monitoring data collected for the SJRRP can improve calibration and validation of these tools and fill in gaps where physical data was previously unavailable. Table 4-1 presents the analytical tools that have been identified to support operations decisions and analysis for technical studies described in Appendix A. These analytical tools are at different levels of development, as described in the status column in Table 4-1. Data collected from the monitoring network may be used to update the models listed in Table 4-1 to support refinement and calibration.

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	See Table 4-2: 2D Model Status	
SRH-2D	Sediment	Transport/habitat mapping	See Table 4-2: 2D Model Status	
SRH-2D	Temperature	Habitat mapping	See Table 4-2: 2D model status	
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	

Table 4-2. Two-Dimensional (SRH-2D) Model Status by Reach

Reach	Updated Terrain Completed?	Comment on Terrain	Status of 2D Model	Comment on 2D Model	Current Channel Grid Size*	Information Needs
1A	Yes, DWR	Complete, 2008 LiDAR combined with more recent DWR in channel surveys (date unknown)	Completed by DWR	DWR has used for some initial habitat mapping	Unknown	Mesh and calibration data from DWR
1B	Almost	Waiting for filtered LiDAR, 2008 LiDAR combined with 2010 channel surveys	Model built, Reclamation	HW99 to downstream-most gravel pit, overlaps with Reach 2A	20 to 30 feet laterally, 35 to 45 feet longitudinally	Calibration data, possibly from DWR
2A	Almost	Waiting on filtered LiDAR, 2008 LiDAR combined with 2010 channel surveys	Model built, Reclamation	Skaggs Bridge to Chowchilla, upstream overlaps with 1B	20 to 30 feet laterally, 35 to 45 feet longitudinally	None
2B	Yes	Complete, 2008 LiDAR data combined with 2009 channel surveys to RM 207.3	Model built, Reclamation	Existing conditions model ready, extends longitudinally from upstream reach boundary to RM, laterally levee to levee only, does not include Chowchilla Bypass or Mendota Pool	25 to 30 feet lateral, 30 to 45 feet longitudinal	None
3	Yes	Complete, 2008 LiDAR data combined with 2009 channel surveys	No model built		NA	None
4A	No	No task order to complete, have 2009 channel profile data, may need additional data to supplement	No model built		NA	Possibly additional in channel bathymetry

Table 4-2. Two-Dimensional (SRH-2D) Model Status by Reach (Contd.)

Reach	Updated Terrain Completed?	Comment on Terrain	Status of 2D Model	Comment on 2D Model	Current Channel Grid Size*	Information Needs
4B1	Yes	Complete, 2008 LiDAR data combined with in channel data from 1999 cross sections	Model built, Reclamation	Existing conditions model is ready	Approximately 20 feet laterally and 50 feet longitudinally	Using cross section data from 1998/1999, need additional in channel bathymetry to be consistent with other reaches
4B2	No	No task order to complete, some channel profile data from 2009, need additional data to update	No model built		NA	Additional in channel bathymetry
5	No	No task order to complete, have 2009 channel profile data, may need additional data to supplement	No model built		NA	Additional in channel bathymetry
ESB	No	No task order to complete, some channel profile data from 2009, need additional data to update	No model built		NA	Additional in channel bathymetry

Note:

* Grid sizes can be automatically refined for higher resolution model results

Key:

2D = two-dimensional

DWR = California Department of Water Resources

ESB = Eastside Bypass

HW = highway

LiDAR = light detection and ranging

NA = not applicable

Reclamation = U.S. Department of the Interior, Bureau of Reclamation

RM = river mile

5.0 Studies

This Agency Plan describes studies that will be implemented in the next year. Table 5-1 comprehensively lists ongoing studies and Table 5-2 lists studies that are currently on hold. Appendix A describes studies, including methods and tasking information, as the Agencies address ATR needs. Results from these studies will be used to address information needs identified under Problem Statements in the ATR. The ATR describes information needs for implementing the SJRRP that require monitoring and analysis. Information needs describe background information and anticipated management actions.

Subsequent ATRs will report results and conclusions from studies. Documented studies help the SJRRP document expenditures, prioritize work, and potentially facilitate identification of alternative approaches.

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
2.0	Historical and Water Year Flow Gage Record Analysis	Katrina Harrison, Reclamation	Data collection ongoing. Analysis of 2010 data.	Updated MIL-GRF table for 2010 Interim Flows; Updated reach-specific loss tables	Friant Dam- Gravelly Ford; Gravelly Ford-Merced Confluence	WY 2010 data available in Draft 2 ATR. Analysis available in Final 2010 ATR.
3.0	Flow Travel Time from Friant Dam and Tributaries to Gravelly Ford	Katrina Harrison, Reclamation	Data collection ongoing. Analysis of 2010 data.	Reevaluate MIL release for GRF target; Define range of precision for operations; reevaluate manual flow measurements frequency	Friant Dam- Gravelly Ford	WY 2010 data available in Final 2010 ATR. Analysis available in Final 2010 ATR.
4.0	Sediment and Hydraulics Monitoring and Analysis	Elaina Gordon, Reclamation	Data collection ongoing. Analysis of 2010 data.	Updated problem statements and input for site-specific projects	Restoration Area	
5.0	Lateral Gradient of Water Table	Stephen Lee, Reclamation	Data collection ongoing.	New monitoring thresholds, seepage conceptual model	Reaches 1–4A, Eastside Bypass, Reach 5	
6.0	Terrain Comparison Between Wells and Fields	Stephen Lee, Reclamation	Survey new monitoring well locations and hand-auger sites from 2010. Compare with 2008 terrain surface.	New below-ground-surface threshold	Restoration Area except Reach 4B2	
7.0	Changes in Salinity Conditions Resulting from Interim Flows	Joe Brummer, Reclamation	Data collection ongoing during fall 2010, March/April 2011, September 2011; before/after spring flows.	Add time component to thresholds	85 Measurements	Spring 2010 data available in Final 2010 ATR.

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan (contd.)

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
8.0	Flow Restrictions Due to Seasonal Groundwater Conditions	Stephen Lee, Reclamation	Data collection ongoing.	Identify priority locations and solutions for flow restrictions	Restoration Area except Reach 4B2	
9.0	Monitoring Well Network Optimization	Katrina Harrison, Reclamation	Reevaluate after 2011 Spring pulse.	Updated well network	Restoration Area except Reach 4B2	Installation of new wells as needed, spring/fall 2011.
10.0	Surface Water Profile Surveys and Discharge Measurements	Dave Encinas, DWR	Data collection ongoing.	Validate and calibrate hydraulic model; predict inundation	Reaches 1–3	Spring 2010 data available in Draft 1 ATR
11.0	Monitoring Cross Section Resurveys	Dave Encinas, DWR	Data collection ongoing.	Understand magnitude and rate of channel bed and bank dynamics	Reaches 1–2A	Spring 2010 data available in Final ATR
12.0	Effects of Sand Mobilization on High-Flow Water Surface Elevations	Dave Encinas, DWR	Data collection ongoing.	Assess erosion and deposition patterns, channel capacity, and flood risk in sand-bed reaches		Spring 2010 data available in Draft 1 and analysis in Final ATR
13.0	Sand Storage in Reach 1	Dave Encinas, DWR	Data collection completed in summer 2010. Analysis to be completed in 2010.	Assess effects of sand depletion on vertical stability of sand-bed reaches	Reach 1	Spring 2010 data and analysis available in Final ATR
14.0	Additional Water-Level Recorders	Dave Encinas, DWR	Data collection ongoing.	Validation and calibration of flood routing models; predict inundation levels	Reach 1	Spring 2010 data available in Draft 1 ATR
15.0	Temperature Monitoring for Millerton Cold Water Pool	Erin Rice, Tracy Vermeyen, Reclamation	Data collection ongoing at existing sensors.	Document seasonal evacuation of Millerton cold water pool	Millerton Lake	Data/analysis through November 2010 in Final 2010 ATR

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan (contd.)

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
16.0	Evaluation of Law Enforcement Needs and Regulatory Changes to Limit Harvest	Eric Guzman, DFG	Phase 1 – Recreational Impact Study in progress.	Develop regulatory, law enforcement, and public education strategies to protect reintroduced salmon	Reach 1	
17.0	Reach 1A Spawning Area Bed Mobility	Matt Meyers, DWR	Data collection ongoing. Implementation to follow further analysis of results. Analysis of 2010 tracer survey, force gage measurements, bed photos. Installing replacement tracers. Survey tracers mobilized after fall and spring pulse flows.	Refine bed mobility threshold to calibrate existing entrainment model and refine extent of spawnable habitat	Reach 1A	Summer and fall 2010 data in Final 2010 ATR.
18.0	Monitoring Spawning Gravel Quality and Quantity	Eric Guzman DFG	Meso-habitat mapping and micro-habitat evaluation during spring 2011.	Evaluate availability and suitability of spawning habitat for egg survival	Reach 1	
19.0	Effect of Scour and Deposition on Incubation Habitat in Reach 1A	Matt Meyers, DWR	Expected start date November 2010, pending permits. Sample in January 2011 and spring 2011. Artificial redds capture changes in gravel scour or fine sediment deposition.	Identify relationship between fine sediment infiltration and flow; quantify the degree of impact on DO delivery to eggs and, therefore, the survival of alevins to emergence.	Reach 1A	Winter data in Final 2010 ATR.
20.0	Juvenile Salmonid Survival and Migration	Michelle Workman, USFWS	Fish tag receivers to be installed summer 2011	Identify areas contributing to smolt survival/ mortality including predation, entrainment, and physical habitat features	Reaches 1-5	

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan (contd.)

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
21.0	Floodplain Inundation	Erin Rice, Rachel Barnett-Johnson, Reclamation	1. Inundation areas from aerial photos 2. Inundation maps for 18 flow rates from 1-D modeling (except Reach 4B1) 3. Continued development of 2-D model	Information needed to assess quantity and quality of floodplain habitat for juvenile salmon as a function of discharge	Reaches 1-5	Aerial photos inundated habitat atlases in Final 2010 ATR; 1-D inundation maps in Final 2010 ATR
22.0	Water Quality Study	Chris Eacock, Reclamation	Data collection ongoing.	Updated Water Quality monitoring parameters; informed flow release decisions	Reaches 1-5	Data available in Final 2010 ATR
23.0	Effect of Altered Flow Regime on Channel Morphology in Reach 1A	Matt Meyers, DWR	Data collection ongoing.	Bed texture, bar/riffle height, pool depth information resulting from flow changes; channel modeling; evaluation of habitat quality	Summer 2010 data in Draft 2 2010 ATR	
24.0	Temperature Monitoring for Adult Migration	Eric Guzman, DFG	Data downloads, monitoring network updates.	Evaluate relative importance of factors which influence stream temperatures	Summer 2010 data in Final 2010 ATR, analysis of spring 2010 data in Final 2010 ATR, temperature monitoring network atlas in Final 2010 ATR	
25.0	Adult Passage Study	Amanda Peisch, DWR	Conduct second pass and modeling on sites requiring additional info following first pass.	Evaluate structures for fish passage; model validation and development	First Pass Evaluation Report in Final 2010 ATR	
26.0	Hyporheic pots	Eric Guzman, DFG; S. Mark Nelson, Reclamation	Data collection ongoing.	Streambed prey availability and habitat assessment	Reach 1	

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan (contd.)

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
27.0	Hills Ferry Barrier Evaluation	Matt Bigelow, DFG; Don Portz, Reclamation	Evaluation starts fall 2010.	Evaluate barrier effectiveness		
28.0	Temperature modeling	Katrina Harrison, Reclamation	1. Validation of HEC-5Q model with 2010 temp data. 2. Model runs conducted during winter 2010/11 in support of flow scheduling.	Information for flow recommendations	Results from model runs available as a separate attachment during spring 2011	
29.0	Fall-run Chinook Experimental Captive Rearing Study	Paul Adelizi, DFG	Rearing starts fall 2010.	Identify problems in the culture system before rearing listed species; develop best mgmt. practices	Interim Conservation Facility at the San Joaquin Hatchery	
30.0	Temperature Tolerance Study	Paul Adelizi, DFG	Rearing starts fall 2010.	understanding of the genetic basis of thermal tolerance in this run; develop San Joaquin specific temperature requirements	UC Davis	
31.0	Benthic Macroinvertebrate SWAMP Bioassessment	Abimael León, DWR; Margarita Gordus, DFG	Data collection ongoing. Analysis of 2010 benthic samples. Bioassessment after spring pulse flows, within the Index Period of May and September 2011.	Use macroinvertebrate bioindicators to evaluate ecological integrity and stream conditions for fish reintroduction.		
32.0	Egg Survival Study	Michelle Workman, FWS	Spring 2011.	Collaborate with artificial redd construction and hyporheic pots studies to determine salmonid survival through use of all run Chinook eggs		

Table 5-1. SJRRP Studies: Spring 2011 Agency Plan (contd.)

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/Expected Start Date	Expected Outcome	Spatial Extent	Data/Analysis Availability
33.0	Monitor Intragravel Dissolved Oxygen Concentrations in the San Joaquin River	S. Mark Nelson, Reclamation; Gregory Reed, Reclamation	Fall 2011	Continuous intragravel DO data at different flow rates during the Interim Flows Fall Pulse in fall 2011		
N/A	Steelhead Monitoring Plan		Plan under development by FMWG.			N/A

Key:

ATR = Annual Technical Report

DFG = California Department of Fish and Game

FMWG = Fisheries Management Working Group

GRF = Gravelly Ford

MIL = Friant Dam

Reclamation = U.S. Department of the Interior, Bureau of Reclamation

SJRRP = San Joaquin River Restoration Program

USFWS = U.S. Fish and Wildlife Service

WY = water year

Table 5-2. Potential Future SJRRP Studies

Appendix A Section	Study	Point of Contact/ Agency	Implementation Planned for Spring 2011/ Expected Start Date	Expected Outcome	Data/ Analysis Availability
35.0	Reach 1A Mechanical Disturbance to Enhance Mobility	Matt Meyers, DWR	Currently on hold.	Evaluate effectiveness of management option (bed mobility, flushing fine sediment)	Reach 1A
36.0	Reach 1A Gravel Augmentation	Matt Meyers, DWR	Currently on hold.	Evaluate effectiveness of management option (bed mobility, flushing fine sediment)	Reach 1A
37.0	Migration Cues		Currently inactive.	Quantitative assessment of volume of water from different sources at different San Joaquin River locations	

Key:
 DWR = California Department of Water Resources
 Reclamation = U.S. Department of the Interior, Bureau of Reclamation
 SJRRP = San Joaquin River Restoration Program

6.0 Summary

The Agency Plan is a means for the SJRRP to disclose to the RA, Settling Parties, and other audiences the next year's monitoring and analysis activities designed to address needs identified in the ATR. The main body of the Agency Plan is intended to provide an overview of the monitoring activities, tools, and studies that will be conducted in the next year. Appendix A is intended to provide a detailed review of the studies that will be conducted in the next year. These studies will be performed during 2011 and will be reported in the 2011 ATR. However, if unexpected challenges are encountered, not all studies may be performed. The results from these studies may lead to newly identified questions that would require reformulation and development of studies. Reformulated studies would then be implemented and presented in the subsequent year's Agency Plan.

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7.0 References

San Joaquin River Restoration Program (SJRRP). 2009. Draft Fisheries Management Plan: A Framework for Adaptive Management in the San Joaquin River Restoration Program. Available at <<http://restoresjr.net/>>.

U.S. Bureau of Reclamation. 2009. Water Year 2010 Interim Flows Project Final Environmental Assessment and Finding of No Significant Impact/Initial Study and Mitigated Negative Declaration. September 2009.

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