

Appendix D

Surface Water Quality

2011 Draft Annual Technical Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM



**San Joaquin River Restoration Program
Summary of Water and Sediment Monitoring Program 2009 - 2011**

	Fall 2009	2010	2011	Total
Number of real-time monitoring sites	20	20	23	
Number of water quality monitoring sites	11	7	9	
Number of sediment monitoring sites	10	7	0	
Number of water samples collected	44	55	42	141
Number of sediment samples collected	12	7	0	19
Number of lab analyses of water			1,212	6,115
Number of lab analyses of sediment			0	576
Number of constituents measured in water			57	219
Number of constituents measured in sediment			0	57
Number of measureable results in water			754	2,115
Number of non-detects (below lab detection level) in water			452	3,994
Number of measureable results in sediment				123
Number of non-detects (below lab detection level) in sediment				453



October 2010 SJRRP water samples from seven sites, including pesticides

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List of Abbreviations and Acronyms

QA	quality assurance
QC	quality control
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	river mile
Regional Board	Central Valley Regional Water Quality Control Board
SJRRP	San Joaquin River Restoration Program
SWRCB	State Water Resources Control Board

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1.0 Monitoring Methodology

This appendix is a summary of water quality monitoring conducted in 2011 in support of the restoration of the San Joaquin River. This monitoring is directed by two documents: Paragraph 16(a)(1) of the Stipulation of Settlement¹:

16. In order to achieve the Water Management Goal, immediately upon the Effective Date of this Settlement, the Secretary, in consultation with the Plaintiffs and the Friant Parties, shall commence activities pursuant to applicable law and provisions of this settlement to develop and implement the following:

(a) A plan for recirculation, recapture, reuse, exchange, or transfer of the Interim Flows and Restoration Flows for the purpose of reducing or avoiding impacts to water deliveries to all of the Friant Division log-term contractors caused by the Interim Flows and restoration Flows. The plan shall include provisions for funding necessary measures to implement the plan. The plan shall:

(1) ensure that any recirculation, recapture, reuse, exchange, or transfer of the Interim Flows and Restoration Flows shall have no adverse impact on the Restoration Goal downstream water quality, or fisheries;

and with the 2010 Water Rights Order², paragraphs 25 and 26:

25. Reclamation shall implement the 2009-2013 Interim Flow Release Program Water Quality Monitoring Plan in Appendix E of the Supplemental EA. Requests for modification of the Interim Flow Release Program Water Quality Monitoring Plan shall be submitted in writing to the Deputy Director for Water Rights, and may only be made upon written approval from the Deputy Director for Water Rights.

26. Reclamation shall develop and submit to the Deputy Director for Water Rights by February 1, 2011, a water quality response plan that addresses the following: (a) the contribution of Interim Flows to high salinity conditions in the DMC, Mendota Pool, and Fresno Slough; (b) an identification of the different entities and individuals that may contribute to or play a role in the response to high salinity conditions; (c) the current legal and contractual roles and responsibilities of those entities; and (d) possible response mechanisms, including those that are under the control of Reclamation and those that are the responsibility of other entities and individuals.

¹ U.S. District Court, Eastern District of California, September 13, 2006. Case No. CIV S-88-1658 LKK/GGH Notice of Lodgment of Stipulation of Settlement. Natural resources Defense Council, et al., v. Kirk Rodgers, et al.

² California Environmental Protection Agency, State water resources Control Board, Division of Water Rights. September 10, 2010. Order WR 201-0029-DWR, Order Approving Temporary Transfer of Water and Change Pursuant to Water Code Sections 1725 and 1707. San Joaquin River.

The SJRRP Interim Flow Release Program water quality monitoring plan is available here:

<http://www.restoresjr.net/activities/if/20100108SJRRPWQMP2010-2013.pdf>

The program is based on a series of 23 stations along the river and its major tributaries that provide real-time measurements of physical parameters (flow, stage/depth, temperature, salinity, DO, etc.). The raw data are posted on the California Data Exchange network:

<http://cdec.water.ca.gov/queryQuick.html>

Here is a graphic that summarizes current conditions at these stations:

<http://www.restoresjr.net/flows/Water%20Quality/index.html>

Reclamation staff developed macros for easily downloading these data for research.

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

No sediment samples were collected in 2011. We plan to do so in October 2011. Winter rainstorms caused local flooding from various tributaries. We collected special samples in March of floodwater from Panoche Creek that entered the Mendota Pool. Appendix D is a summary of available data collected during 2011.

The monitoring methods are presented separately in this document for surface water quality and surface water temperature.

1.1 Surface Water Quality

The SJRRP water quality monitoring program uses data from a series of sondes that provide real-time measurements of physical parameters (flow, depth, temperature, salinity, etc.) plus grab samples from key locations along the river. Data from other monitoring programs, such as the Grassland Bypass Project, are incorporated where appropriate.

The sites of water quality monitoring stations for the San Joaquin River Restoration Program (SJRRP) water quality monitoring plan are summarized in Tables D-1, D-2, and D-3.

1.1.1 Real-Time Water Quality Monitoring Parameters

Reclamation, the California Department of Water Resources (DWR), and the U.S Geological Survey (USGS) operate a series of 23 stations along the San Joaquin River and major tributaries. Each station has a multi-parameter sonde that measures physical conditions, including temperature, electrical conductivity (salinity), pH, dissolved oxygen, turbidity, and chlorophyll. These data are typically measured every 15 minutes and sent via satellite to the operating agency. The California Data Exchange Center (CDEC) posts the raw data here:

<http://cdec.water.ca.gov/queryQuick.html>

Table D-1 is a summary of the stations and the parameters. Reclamation has developed macros for easily downloading these data and presenting them in a graphic:

<http://www.restoresjr.net/flows/Water%20Quality/index.html>

1.1.2 Grab Samples

The SJRRP water quality monitoring program also deals with many constituents that cannot be measured with in-situ sondes. Table D-2 is a list of parameters measured at various sites along the Restoration Area was determined according to the needs of scientists addressing fish restoration. The list, originally developed for in accordance with Section 22 of the 2009 Water Rights Order³, includes these constituents:

- Total suspended solids
- Nutrients: total nitrogen, ammonium, nitrite, nitrate, total Kjeldahl nitrogen, total phosphate, , chlorophyll
- Total organic carbon /dissolved organic carbon
- Bacteria: total coliform, fecal coliform, and *E. coli*
- Trace elements:
 - cations (calcium , magnesium , potassium , sodium);
 - anions (chloride , carbonate , bicarbonate);
 - metals (arsenic, boron, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc)
- Pesticides: carbamates, organophosphates, organochlorines and pyrethroids
- Bed sediment: Total organic carbon, Trace elements, organochlorine scan, pyrethroid scan, toxicity

³ WR 2009-0058-DWR

Grab samples were collected from the stream-bank or bridge into a bucket or churn-splitter, and then poured directly into special bottles for each type of analysis.

Samples were collected, preserved, and handled according to Reclamation quality assurance (QA) practices, which included the incorporation of blank, reference, duplicate, and spiked samples to verify laboratory and field measurements. Because of short holding times, TSS, bacteria, pesticides, and chlorophyll samples were shipped from the field directly to laboratories.

1.1.3 Sediment Samples

Table D-3 is a summary of sediment analyses that will be conducted along the river in October 2011.

1.1.4 Quality Control

Quality control (QC) is the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that stated requirements are met. QA is an integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement implemented so that a process, item, or service is of the type and quality needed and expected by the customer.

A Quality Assurance Project Plan was written for all SJRRP flow, water quality, groundwater level, and sediment monitoring. QA objectives were used to validate the data for this project. The data were accepted, rejected, or disqualified based on how sample results compared to established acceptance criteria. Precision, accuracy, and contamination criteria were used by the Quality Control Officer to validate the data for this project. The criteria were applied to the blind external duplicate/split, blank, reference, or spiked samples submitted with the production samples to the analytical laboratories by the participating agencies to provide an independent assessment of precision, accuracy, and contamination.

Samples must be prepared, extracted, and analyzed within the recommended holding time for each parameter. Data may be disqualified if a sample was analyzed after the holding time expires. Completeness refers to the percentage of project data that must be successfully collected, validated, and reported to proceed with their intended use in making decisions.

1.2 Surface Water Temperature

Data loggers were installed by the California Department of Fish and Game (DFG) at predetermined intervals to best illustrate the temperature regime of the San Joaquin River as defined by the Fish Management Work Group.

All data loggers were programmed to record temperatures hourly on a continuous, year-round basis. As water and air temperature data collection progresses, and modeling

begins, the need for additional weather stations, or redeployment of existing stations, may be required.

1.2.1 Methodology

Each data logger was enclosed in a submersible case to prevent damage, and anchored with stainless steel cable. Field data were recorded at each logger location. An identification number was assigned to each site logger. All data were downloaded into an HOBO® waterproof shuttle and uploaded later into a field computer.

Variations in field sampling were addressed through a field check of the instruments with a hand-held thermometer at all thermograph sites after deployment and retrieval. Field auditing (e.g., data QA/QC) was performed at each site visit. Field crews collecting data took a water temperature reading at each sampling station using a thermometer. The thermometer was placed in the stream near the thermograph. The water temperature and time were recorded in a field notebook and used as a cross-reference check for auditing data. Comments were also recorded in the field and were used to help determine the validity of the data (i.e., “thermograph out of the water” or “buried in sand”) and or possibly a malfunctioning thermograph. If the latter was suspected, a second thermograph was placed to cross-reference the data, or the thermograph was retrieved and recalibrated using the same procedure.

Temperature loggers deployed in pools required an acrylonitrile butadiene styrene (ABS) pipe housing drilled with 0.25 inch holes to allow water to flow through freely. A threaded coupler was used on one end with a galvanized steel plug that functioned as a weight and allowed access to the sensor. The opposite end was closed with an ABS cap. Loggers were spaced on temperature profiling strings to continuously monitor temperature stratification.

Data loggers recording air temperature were attached to stream-side vegetation. Locations for air temperature monitoring were chosen where direct solar radiation was avoided, but where the units were able to record air temperature.

Methods for implementation procedures of the Millerton Reservoir temperature monitoring study are described in the **Millerton Lake Temperatures Report**.

1.2.2 Calibration Procedures

HOBO® U22 Water Temp Pro v2 data loggers from Onset were used by DFG to collect surface water temperature readings. The thermographs were calibrated using the Calibration and Standardization Procedure adopted and modified from Lewis et al. (2000). This procedure tests each thermograph logger for room air temperature, room temperature water, and cold water temperature against a National Institute of Standards and Technology thermometer for precision and accuracy. All thermographs were calibrated before deployment using this procedure unless the manufacturer sent a certification of accuracy for each unit (Onset’s HOBO® Temp Pro); however, 10 percent of these certified units were being double-checked for calibration accuracy before deployment.

1.2.3 Quality Control

An important aspect of data collection and reporting is to promote data integrity and validity. The structure of the local DFG database and the characteristics of Microsoft Access usually enforce the integrity of the data. DFG staff used a database equipped with a QA/QC Utility to detect questionable data to help in the validation process. The QA/QC Utility is designed to flag any data points that have a value in excess of a certain tolerance when compared with adjacent points. To minimize the possibility that erroneous data would migrate to other applications, the database will not allow the user to generate any reports or graphs until a QA/QC check is performed and all data points tagged with QA/QC codes are cleared.

The QA/QC Utility enables the user to observe which data had been tagged, and provides the user with an editor to clear the data. The data are also graphed and visually inspected. Data that appear to be erroneous are either modified (accepted) or nullified (deleted). These edits are done in a second data column. The original data are always retained for review. Professional judgment is required to determine whether or not to accept (e.g., by interpolating with other points) or to nullify the data. This decision is made on a case-by-case basis by DFG staff in concert with the modeling team who assesses the original and modified data.

Once processed, the data can be used for temperature model application purposes and to generate graphs and reports. Updates are exported to the California Data Exchange Center for inclusion in the global database.

2.0 Data

This section presents surface water quality (real-time and grab samples) and temperature data collected during the 2010 Interim Flows.

Table D-4 describes landmark river mile (RM) locations of important landmarks, tributaries, and bridges across the river.

2.1 Surface Water Quality

During the first half of 2011, 42 samples of water were collected by Reclamation from nine sites along the river. Special samples were collected in April to measure pesticides. More than 1200 analyses have been made of these water samples.

No sediment samples have been collected this year, but we plan to do so in October 2011. Preliminary data indicate that there are few contaminants of concern in Reaches 1 and 2, between Friant Dam and the Mendota Pool. Despite the adjacent urban areas, no herbicides or pesticides were detected in water samples.

Several trace elements were measured in the water below Mendota Dam due to the inflow of water from the Delta-Mendota Canal, and other tributaries. Winter rains caused Panoche Creek to flood, sending seleniferous water into the Mendota Pool. The Kings River also flowed north through the Pool scouring sediments into the lower river.

There are many known sources of contamination in the San Joaquin River below Mendota Dam that are monitored by Reclamation and the Regional Board. Preliminary data do not show a measureable improvement in water quality (due to the arrival of Interim Flows water).

2.1.1 San Joaquin River Below Friant Dam (Lost Lake Park)

A full suite of parameters was analyzed for surface water quality samples collected from the San Joaquin River below Friant Dam at Lost Lake Park during the first half of 2011 are listed in Table D-5.

2.1.2 San Joaquin River near Highway 99 (Camp Pashayan)

A full suite of parameters was analyzed for surface water quality samples collected from the San Joaquin River near Highway 99 at Camp Pashayan during the first half of 2011 (Table D-6).

2.1.3 San Joaquin River at Gravelly Ford

Table D-7 is a summary of constituents that were analyzed in water samples collected from the San Joaquin River at Gravelly Ford during the first half of 2011.

2.1.4 Mendota Wildlife Management Area

Reclamation collected grab samples of water from the boat ramp within the Mendota Wildlife Management Area to measure selenium. The results are listed Table D-8.

2.1.5 Floodwater from Panoche Creek

During February and March 2011, rainstorms caused flooding across the alluvial fan of Panoche Creek, west of Mendota. Some of this water flowed along Belmont Avenue. The City of Mendota diverted some of this flood water into the San Luis Drain. Some of this water flowed north along Douglas and San Diego Avenues to the first lift canal of Firebaugh Canal Water District, and then into the Mendota Pool. Reclamation took grab samples of the flood water from various places (Table D-9).

2.1.6 San Joaquin River near Mendota (below Mendota Dam)

Water samples were collected from the river below Mendota Dam during the first half of 2011 (Table D-10).

2.1.7 San Joaquin River at Highway 152

Water samples were collected from the river near the Highway 152 bridge during the first half of 2011 (Table D-11).

In addition, water samples were collected from the Eastside Bypass at Highway 152 (Table D-9b).

2.1.8 Eastside Bypass at Highway 152

Reclamation collected water samples at this location during spring 2011 (Table D-12).

2.1.9 San Joaquin River at Fremont Ford

Water samples were collected from this site during the first half of 2011. During much of March and April 2011, this site was flooded with backwater from the Merced and San Joaquin Rivers (Table D-13).

2.1.10 San Joaquin River at above Merced River (Hills Ferry)

Water samples were collected from this site during the first half of 2011 (Table D-14).

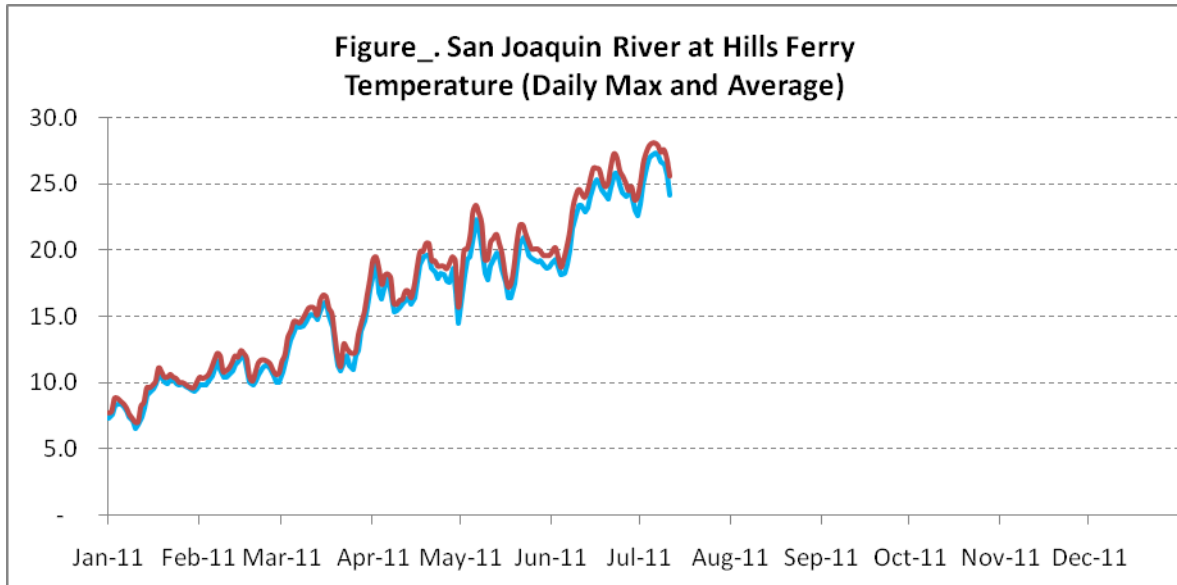


Figure __. San Joaquin River at Hills Ferry
Mean Daily Dissolved Oxygen (mg/L)

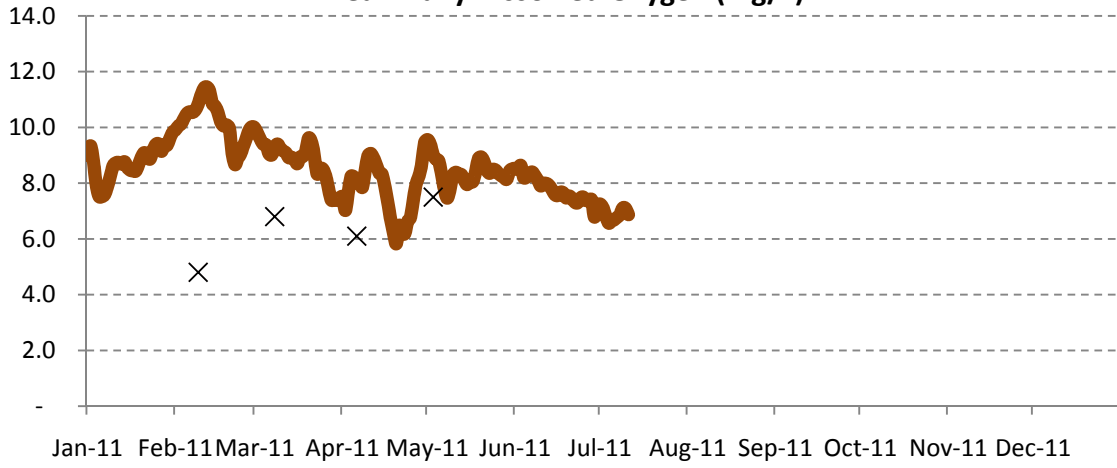
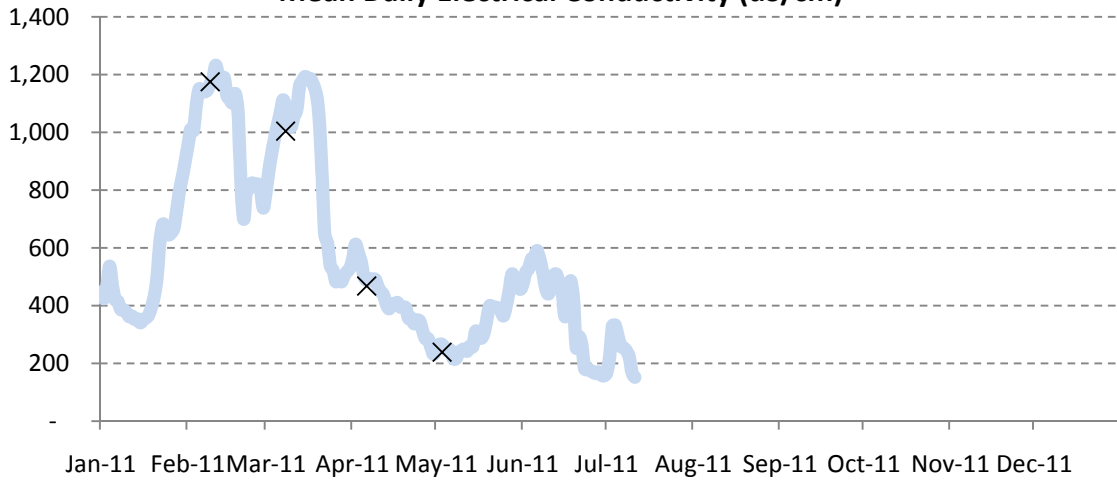
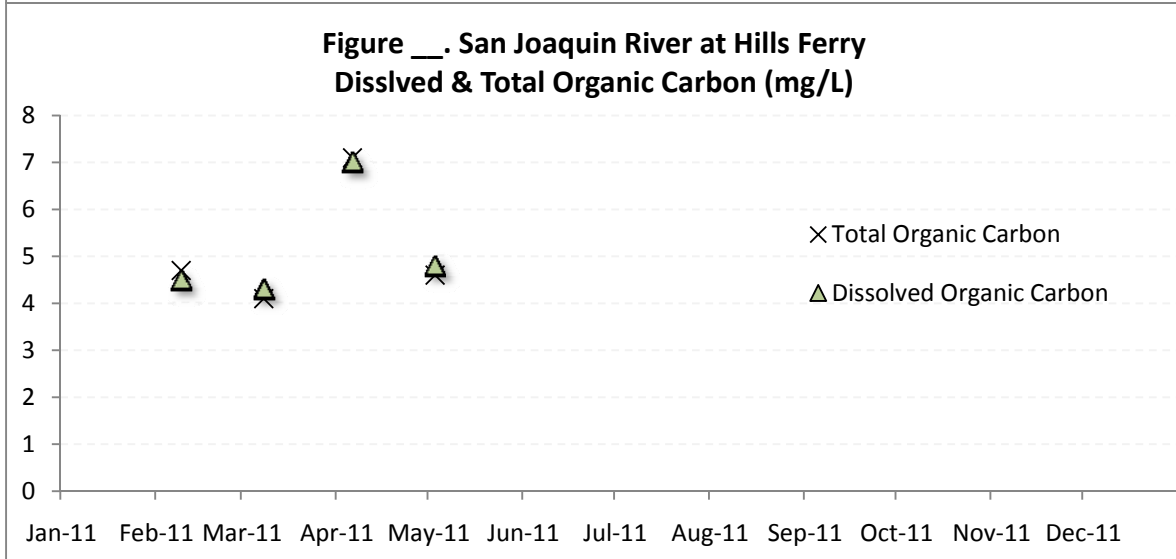
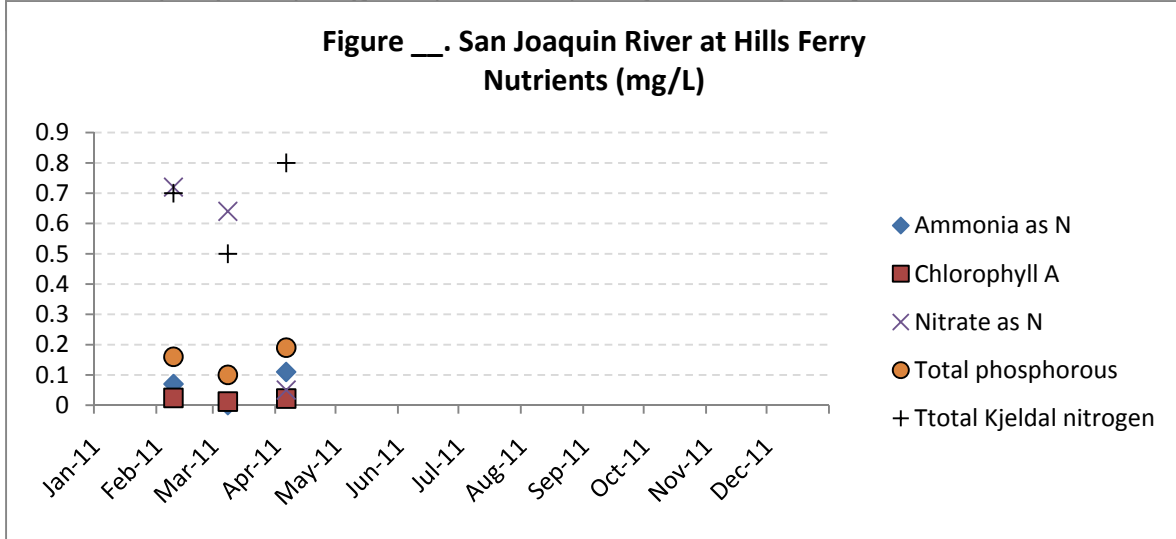
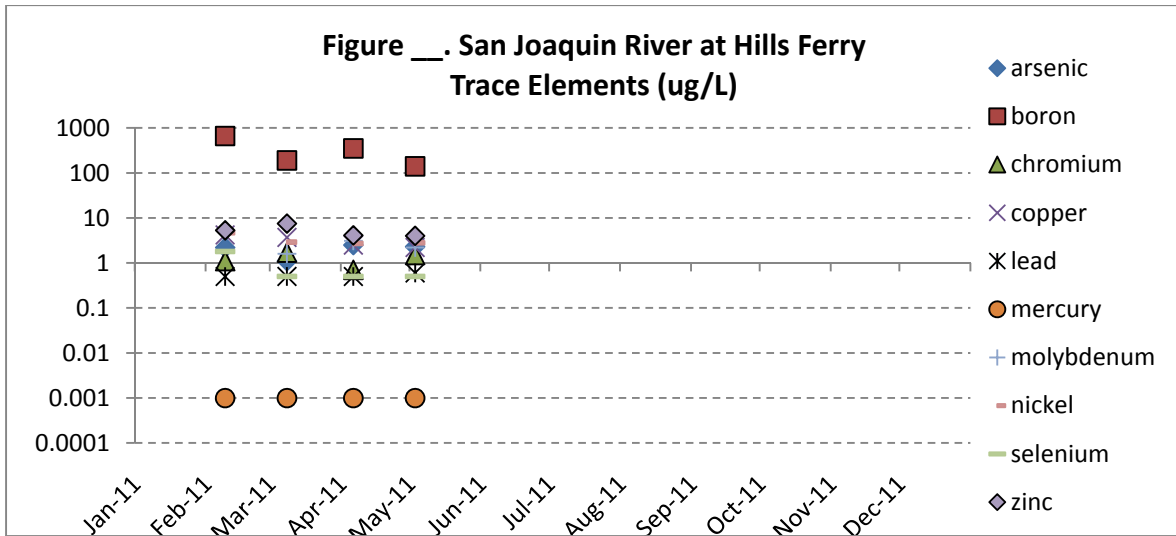


Figure __. San Joaquin River at Hills Ferry
Mean Daily Electrical Conductivity (uS/cm)





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San Joaquin River Restoration Program Table D-1. Real-time Monitoring Sites (2011)													
River Mile	Location	Reach	Operating Agency	CDEC	discharge	stage	temperature	EC	DO	pH	turbidity	chlorophyll	Notes
268.0	Millerton Lake		BOR	MIL									Reservoir data
268.0	Friant Dam		BOR	FRT									Weather data
267.0	San Joaquin River at Friant Dam	1A	BOR	FWQ			H	H	H	H	H	H	
266.0	San Joaquin River below Friant	1A	USGS	SJF	E/H	E/H	E	E					
255.2	San Joaquin River at Hwy 41	1A	BOR	H41	E	E	E						
240.7	San Joaquin River at Donny Bridge	1B	BOR	DNB	E	E	E	E					
227.6	San Joaquin River at Gravelly Ford	2A	BOR	GRF	E/H	E/H	E/H	E/H	E	E	E	E	
215.9	Chowchilla Bypass	2A	SLDMWA	CBP	E/H	E/H							
216.0	San Joaquin River below Bifurcation	2B	BOR	SJB	E/H	E/H	E	E	E	E	E	E	
211.9	San Joaquin River at San Mateo Ford	2B	USGS	SJN	E	E							
	James Bypass (Kings River inflow to Mendota Pool)	2B	SLDMWA	JBP	E/H	E/H							
206.0	Delta-Mendota Canal Check 21 (tributary)	2B	BOR	DM3		E	H	D/E/H					
202.1	San Joaquin River near Mendota (below Mendota Dam)	3	USGS	MEN	D/E/H	E/H							
181.5	San Joaquin River near Dos Palos	4A	DWR	SDP	E	E	D/E	D/E	D/E	D/E	D/E	D/E	
	Eastside Bypass near El Nido		DWR	ELN	D/E/H	E/H							
168.4	San Joaquin River near Washington Road	4B	DWR	SWA	E	E	D/E	D/E	D/E	D/E	D/E	D/E	
132.8	San Joaquin River near Stevinson	4B	DWR	SJS	D/E/H	E/H	D/H	D/H					
127.5	Salt Slough at Hwy 165 near Stevinson (tributary)	4B	USGS	SSH	D/E/H	E	D/E	D/E					GBP Site F
125.1	San Joaquin River at Fremont Ford	5	USGS	FFB	D/E/H	E	D/E	D/E					GBP Site G
121.2	Mud Slough near Gustine (tributary)	5	USGS	MSG	D/E/H	E	D/E	D/E					GBP Site D
118.3	San Joaquin River above Merced River near Newman	5	USGS	SMN	E	E	E	E	E				GBP Site H
118.1	Merced River near Stevinson (tributary)	5	DWR	MST	D/E/H	E/H	D/H	D/H					
118.0	San Joaquin River at Newman	downstream	USGS	NEW	D/E/H	E/H							
107.2	San Joaquin River at Crows Landing	downstream	USGS	SCL	D/E/H	E/H	D/E	D/E/H					GBP Site N
	D - daily average		BOR - Reclamation, Friant Dam										
	E - event data (15 minute)		CDEC - California Data Exchange Center										
	H - hourly average		DWR - Dept Water Resources, Fresno										
			SLDMWA - San Luis & Delta-Mendota Water Authority										
	Revised: 12 Jul 2011		USGS - US Geological Survey										

San Joaquin River Restoration Program									
Table D-2. Routine Water Quality Monitoring Sites (2011)									
River Mile	Monitoring Site	Reach	TSS	Nutrients	TOC/DOC	Bacteria	Trace Elements	Pesticides	Notes
266	SJR below Friant Dam (Lost Lake Park)	1A	X	X	X	X	X	X	
243	SJR near HWY 99 (Camp Pashayan)	1A	X	X	X	X	X	X	
227	SJR at Gravelly Ford	2A	X	X	X	X	X	X	
	Mendota Wildlife Management Area						Se only		
205	SJR below Mendota Dam	3	X	X	X	X	X	X	
174	SJR at HWY 152	4AB	X	X	X	X	X	X	
	Eastside Bypass at Hwy 152		X	X	X	X	X	X	
125	SJR at Fremont Ford	5	X	X	X	X	X	X	GBP Site G
118	SJR above Merced River (Hills Ferry)	5	X	X	X	X	X	X	GBP Site H
	Water Sample Parameters:								
	TSS: total suspended solids								
	Nutrients: nitrate + nitrite as N, total ammonia, total Kjeldal nitrogen, total phosphate, chlorophyll A								
	TOC/DOC: total and dissolved organic carbon								
	Bacteria: E. coli, fecal coliform, total coliform								
	Anions: bicarbonates, carbonates, chloride								
	Cations: calcium, magnesium, potassium, sodium								
	Trace Elements: arsenic, boron, copper, chromium, lead, nickel, mercury, molybdenum, selenium, zinc								
	Pesticides: Carbamates, pyrethroid scan, organochlorine scan, OP scan (April & October only)								
	Revised: 12 Jul 2011								

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Table D-3. Bed Sediment Monitoring Sites (2011)					
River Mile	Monitoring Site	Reach	TOC	Trace elements	Pesticides
266	SJR below Friant Dam (Lost Lake Park)	1A	S	S	S
255	SJR near HWY 99 (Camp Pashayan)	1A	S	S	S
227	SJR at Gravelly Ford	2A	S	S	S
206	Mendota Wildlife Management Area	2B	S	S	S
205	SJR below Mendota Dam	3	S	S	S
174	SJR at HWY 152	4B	S	S	S
118	SJR at Hills Ferry	5	S	S	S
	Sampling frequency:				
	Samples to be collected in October 2011				
	Bed Sediment Analyses:				
	TOC: total organic carbon				
	Trace Elements: arsenic, boron, copper, chromium, lead, nickel, mercury, molybdenum, selenium, zinc				
	Pesticides: pyrethroids, organochlorine scan				
	Revised: 12 Jul 2011				

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Table D-4. Features by River Mile				
Reach	River Mile	Type	Description	Distance (River Mile)
1	267.6	—	Begin Reach 1 (beginning of project area)	0
	267.6	Facility	Friant Dam (Millerton) (MIL)	0
	267.4	Tributary	Cottonwood Creek Confluence	0.2
	266.0	Gage	San Joaquin River below Friant Dam (SJF)	1.6
	260.6	Tributary	Little Dry Creek Confluence	7
	255.2	Crossing	California State Highway 41	12.4
	255.1	Gage	San Joaquin River at Highway 41 Bridge (H41)	12.5
	245.2	Crossing	Atchison Topeka Santa Fe Railroad	22.4
	243.1	Crossing	California State Highway 99 (Camp Pashayan)	24.5
	240.7	Gage	San Joaquin River at Donny Bridge (DNB)	26.9
	234.2	Crossing	California State Highway 145	33.4
	232.1	Gage	San Joaquin River at Skaggs Bridge (Skaggs)	35.5
2	229.0	—	End Reach 1 – Begin Reach 2	38.6
	227.6	Gage	San Joaquin River at Gravelly Ford (GRF)	40
	216.0	Facility	Chowchilla Bypass Bifurcation Structure	51.6
	216.0	Gage	San Joaquin River below bifurcation (SJB)	51.6
	211.8	Crossing	San Mateo Road	55.8
	204.6	Facility	Mendota Dam	63
3	204.6	—	End Reach 2 – Begin Reach 3	63
	202.1	Gage	San Joaquin River near Mendota (MEN)	65.5
	195.1	Crossing	Avenue 7 1/2 Bridge (City of Firebaugh)	72.5
4A	182.0	—	End Reach 3 – Begin Reach 4	85.6
	182.0	Facility	Sack Dam	85.6
	181.5	Gage	San Joaquin River below Sack Dam	86.1
	173.9	Crossing	California State Highway 152	93.7
4B	169.0	Gage	San Joaquin River at top of Reach 4B	98.6
	168.4	Facility	Reach 4B Head gates Crossing	99.2
	168.2	Gage	San Joaquin River at Washington Road (top of Reach 4B)	99.4
	168.0	Crossing	Indiana Avenue	99.6
	157.2	Crossing	Turner Island Road Bridge	110.4
5	135.8	—	End Reach 4 – Begin Reach 5	131.8
	132.8	Crossing	California State Highway 165	134.8
	125.1	Gage	San Joaquin at Fremont Ford Bridge (FFB)	142.5
	125.1	Crossing	California State Highway 140	142.5
	118.2	Facility	Temporary Fish Screen	149.4
	118.3	Gage	San Joaquin River at Hills Ferry (USGS)	149.3
	118.2	Crossing	Hills Ferry Road	149.4
	118.2	—	Confluence with Merced River - End Reach 5 (end of project area)	149.4

Tables D-5 through D-8 and D-10 through D-16 are located here:
<http://www.restoresjr.net/flows/Data/index.html>.

San Joaquin River Restoration Program				
Table D-9. Selenium in Floodwater from Panoche Creek				
Sample Site	Sample Date	Result Value	Result Units	Method
San Luis Drain at Belmont Ave	2/25/2011	6.8	ug/l	3500
	3/24/2011	11	ug/l	3500
City of Mendota Ditch at Belmont Ave, inflow to San Luis Drain	2/25/2011	12	ug/l	3500
	3/21/2011	11	ug/l	3500
Firebaugh Canal WD Intake Canal at Bass Ave	2/25/2011	1.1	ug/l	3500
	3/21/2011	6.9	ug/l	3500
	3/24/2011	10	ug/l	3500
Belmont Ave at Washoe Ave	2/25/2011	6.1	ug/l	3500
Belmont Ave past Douglas	3/24/2011	15	ug/l	3500
Belmont Ave at San Diego Ave	3/21/2011	11	ug/l	3500
	3/24/2011	16	ug/l	3500
Panoche Creek at Belmont Ave	2/25/2011	13	ug/l	3500
	3/21/2011	11	ug/l	3500
Panoche Creek at Fairfax Ave (Siphon under San Luis Canal)	3/21/2011	12	ug/l	3500
Panoche Creek at quarry above I-5	2/25/2011	11	ug/l	3500
	3/24/2011	15	ug/l	3500
Delta Mendota Canal MP 109.55 R drain inlet near Sump K	3/21/2011	230	ug/l	3500
Shaw Ave at Firebaugh Canal WD Main Lift Canal	4/6/2011	2.1	ug/l	3500

2.2 Surface Water Temperature

DFG collected surface water temperature data from numerous sites along the San Joaquin River during the 2010 Interim Flows period. The data collected from the respective monitoring stations are presented in **Temperature Atlas**.

3.0 References

- California Department of Fish and Game (DFG). 2006. Lower San Joaquin River Basin-Wide Water Temperature Modeling Project Data Collection Protocol. 29 pp.
- Lewis, T., D.W. Lamphere, D.R. McCanne, A.S. Webb, J.P. Krieter, and W.D. Conroy. 2000. Executive Summary: Regional Assessment of Stream Temperatures Across Northern California and Their Relationship to Various Landscape-Level and Site-Specific Attributes. Forest Science Project. Humboldt State University Foundation, Arcata, California. 14 pp.

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