

**Grassland Bypass Project
Interim Baseline Monitoring Program**

Monthly Data Report

July 2014



A Cooperative Effort Of:

U.S. Bureau of Reclamation

Central Valley Regional Water Quality Control Board

U.S. Fish and Wildlife Service

National Marine Fisheries Service

California Department of Fish and Wildlife

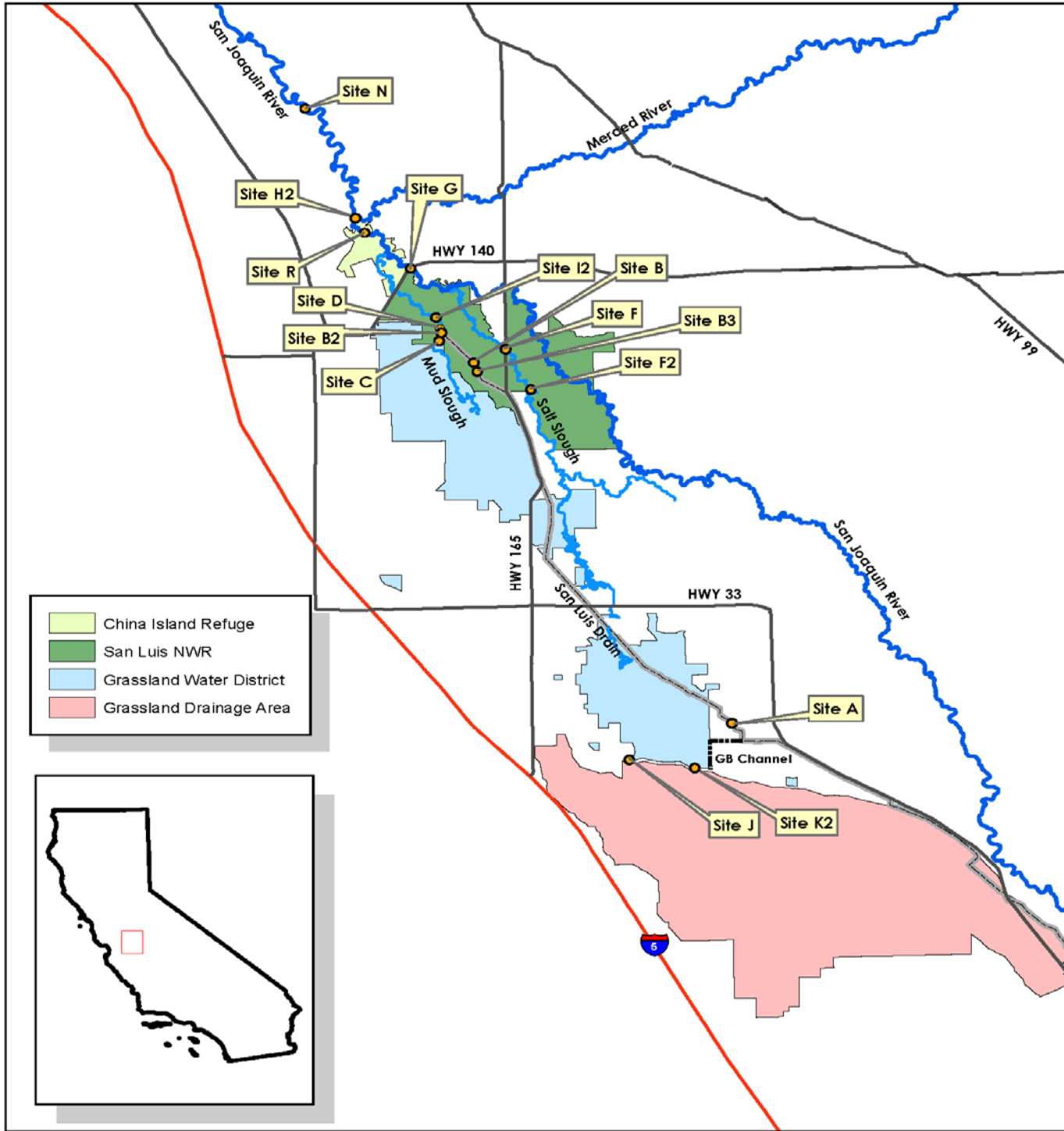
San Luis & Delta-Mendota Water Authority

U.S. Environmental Protection Agency

U.S. Geological Survey

Compiled by San Francisco Estuary Institute

Figure 1. Map of the Grassland Bypass Project area



Grassland Bypass Project

Monitoring Sites

0 2.5 5 10 Miles



Grassland Bypass Project
NAD 1983 California Zone 10
U.S. Bureau of Reclamation



**GRASSLAND BYPASS PROJECT
MONTHLY DATA REPORT**

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Grassland Bypass Project

Table 1a. Water monitoring of inflow to the San Luis Drain (Station A)

PARAMETER	Flow	Temperature	Specific Conductance	Total Dissolved Solids	Total Suspended Solids	Total Selenium	Daily Salt Load
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	Calculated	SLDMWA	SLDMWA/USBR	Calculated
UNITS	cfs	°C	µS/cm	mg/L	mg/L	µg/L	tons
Jul-01-2014	9	26.8	8,690	6,432		26	151
Jul-02-2014	9	24.9	7,740	5,727		32	131
Jul-03-2014	2	25.7	8,140	6,026		25	29
Jul-04-2014	3	26.3	7,890	5,839		25	48
Jul-05-2014	4	26.1	7,130	5,277		24	55
Jul-06-2014	4	26.6	5,840	4,321		28	50
Jul-07-2014	2	24.6	5,820	4,309	108	30	23
Jul-08-2014	7	26.4	5,760	4,263		32	75
Jul-09-2014	5	25.6	6,070	4,491		28	67
Jul-10-2014	4	24.7	6,300	4,659		31	52
Jul-11-2014	7	24.0	6,340	4,694		29	87
Jul-12-2014	4	25.4	7,840	5,801		28	65
Jul-13-2014	4	26.2	8,210	6,078		30	68
Jul-14-2014	5	26.8	9,030	6,685	101	31	84
Jul-15-2014	5	26.7	8,310	6,151		29	78
Jul-16-2014	5	25.5	8,090	5,990		35	85
Jul-17-2014	4	24.9	7,920	5,864		32	71
Jul-18-2014	4	24.8	7,820	5,786		32	69
Jul-19-2014	5	25.3	8,720	6,453		32	78
Jul-20-2014	4	26.3	8,630	6,388		33	71
Jul-21-2014	6	25.3	7,960	5,887	128	25	94
Jul-22-2014	6	26.0	6,650	4,924		23	77
Jul-23-2014	9	25.1	5,630	4,166		20	106
Jul-24-2014	7	26.5	4,700	3,476		26	61
Jul-25-2014	5	27.6	4,660	3,447		26	44
Jul-26-2014	3	27.5	4,870	3,601		25	32
Jul-27-2014	3	27.1	5,440	4,027		25	37
Jul-28-2014	3	26.3	5,810	4,296	173	23	35
Jul-29-2014	2	27.3	5,490	4,059		22	27
Jul-30-2014	1	27.9	5,420	4,013		23	16
Jul-31-2014	1	28.4	5,810	4,302		22	8

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.

Preliminary Results

Site A Selenium data are not collected by Reclamation and have been deemed unreliable by Reclamation Staff.

Table 1b. Monthly Averages and Totals

	Total Flow	Average Temperature	Average Specific Conductance	Average Total Dissolved Solids	Average Total Suspended Solids	Average Selenium	Salt Load	Salt Load Objective
	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	UA3
	acre-feet	°C	µS/cm	mg/L	mg/L	µg/L	tons	tons
Jan-2014	650	9.8	7,320	5,418	46	26	4,620	4,283
Feb-2014	1,040	13.6	6,860	5,074	136	31	6,930	6,779
Mar-2014	600	17.3	7,190	5,323	96	27	3,990	8,031
Apr-2014	360	18.3	7,950	5,112	134	30	1,870	5,910
May-2014	280	21.9	6,200	4,589	97	36	1,690	5,792
Jun-2014	430	24.0	7,000	5,179	154		2,970	5,991
Jul-2014	280	26.1	6,860	5,079	128		1,980	6,055
Cumulative Total	3,640						24,050	42,841

Notes:

Salt load objective based on 2014 critical year type

Table 2a. Water monitoring of San Luis Drain Discharge into Mud Slough (north)
Station B2 (Terminus at Mud Slough) and Station B3 (Gun Club Road)

PARAMETER	Flow (B2)	Temperature (B2)	Specific Conductance (B2)	Total Suspended Solids (B2)	Boron (B3)	Total Selenium (B3)	Daily Selenium Load
DATA SOURCE	SLDMWA♦	SLDMWA	SLDMWA	SLDMWA/USBR	USBR	USBR	Calculated
UNITS	cfs	°C	µS/cm	mg/L	mg/L	µg/L	lbs
Jul-01-2014	6	29.4	9,550			16.2	0.5
Jul-02-2014	6	27.3	9,280				
Jul-03-2014	8	27.6	8,970				
Jul-04-2014	6	29.0	9,210				
Jul-05-2014	5	27.9	9,390				
Jul-06-2014	4	28.5	9,530				
Jul-07-2014	5	26.0	9,640	28			
Jul-08-2014	5	31.7	9,950				
Jul-09-2014	5	27.8	10,100				
Jul-10-2014	6	25.9	10,100				
Jul-11-2014	6	25.0	10,000				
Jul-12-2014	6	25.3	9,730				
Jul-13-2014	6	27.4	9,230				
Jul-14-2014	6	30.8	9,080	34			
Jul-15-2014	5	29.6	9,230				
Jul-16-2014	5	27.7	9,610				
Jul-17-2014	5	26.1	9,920				
Jul-18-2014	6	25.6	10,400				
Jul-19-2014	6	27.7	11,000		22.0	12.2	0.4
Jul-20-2014	6	28.0	11,300		22.0	11.4	0.3
Jul-21-2014	5	26.7	11,400	20	21.0	10.9	0.3
Jul-22-2014	6	26.0	11,300		21.0	11.2	0.3
Jul-23-2014	6	24.4	11,200		20.0	10.6	0.3
Jul-24-2014	7	26.2	10,800		18.0	10.2	0.4
Jul-25-2014	8	28.9	9,480		16.0	9.9	0.4
Jul-26-2014	6	30.3	8,320		14.0	10.1	0.3
Jul-27-2014	6	30.6	8,260		16.0	10.4	0.3
Jul-28-2014	5	29.8	8,210	30	18.0	10.9	0.3
Jul-29-2014	5	31.1	8,460		19.0	11.4	0.3
Jul-30-2014	5	31.8	8,770		20.0	11.3	0.3
Jul-31-2014	5	30.6	9,650		21.0	11.7	0.3

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Data

Table 2b. Monthly Averages and Totals

	Flow (B2)	Average Temperature (B2)	Average Specific Conductance (B2)	Average Total Suspended Solids	Average Boron (B3)	Average Selenium	Selenium Load	Selenium Load Objective
	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	UA3
	acre-feet	°C	µS/cm	mg/L	mg/L	µg/L	lbs	lbs
Jan-2014	970	10.1	5,290	13	10.2	14.0	39	151
Feb-2014	1270	12.6	6,100	139	12.6	26.0	88	93
Mar-2014	900	15.0	5,980	50	11.8	20.8	63	92
Apr-2014	490	18.1	6,570	72	13.0	13.8	19	101
May-2014	400	22.1	6,740	46	12.8	13.6	17	105
Jun-2014	410	25.2	8,150	60	14.6	16.9	25	69
Jul-2014	180	28.1	9,710	28	19.1	11.3	5	70
Cumulative Load Totals	4,620						256	681

Notes:

Selenium load objective based on 2014 critical year type

Table 2c. Water quality monitoring at Station B3 (discharge from San Luis Drain)

PARAMETER	Physicals					Total Selenium	Total Boron	Total Molybdenum
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity			
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE			
UNITS	mg/L	units	µS/cm	°C	NTU	ug/L	mg/L	ug/L
May-08-2014	14.6	9.0	6,050	23.9	15.9	19	11	21
May-16-2014	15.0	8.9	6,370	23.0	27.3	14	12	
May-23-2014	17.7	9.2	6,720	24.8	19.2	11	13	
May-30-2014	29.3	9.2	8,600	28.3		14	18	
Jun-06-2014	16.8	8.9	8,250	25.5	26.6	19	16	
Jun-13-2014	12.7	9.3	8,260	26.4		13	15	
Jun-20-2014	10.5	8.9	9,470	25.0	28.4	11	18	
Jun-26-2014	9.8	8.7	5,920	25.1	14.6	35	10	20
Jul-02-2014		8.9	8,580	26.2	21.2	16	17	
Jul-11-2014	8.5	8.8	8,730	26.9	16.5	13	19	
Jul-18-2014	4.4	9.1	10,600	25.4	13.9	12	24	
Jul-25-2014	6.3	8.8	7,460	26.0	20.1	9	16	
Jul-31-2014	7.5	8.4	10,200	29.6		12	23	9.5

Notes:

	Nutrients				
	Nitrates as N (Dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total Phosphorous as P	Ortho-phosphate as P
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	0.5	0.1	1.4	0.094 V	0.015 T
Feb-27-2014	3.7 T	0.2 L	1.7	0.095 T	<0.010
Mar-26-2014	<0.02	0.1	2.6	0.190 T	<0.010
Apr-25-2014					
May-08-2014	0.2	0.3	3.0	0.190 T	< 0.010
Jun-26-2014	4.8	1.1 U	3.5	0	< 0.050
Jul-31-2014	< 0.02	0.2 V	3.7	0.150	< 0.010

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (Dissolved)	Sulfate (Dissolved)	Total Organic Carbon
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	270	110	6.8	620	670	1,400	NA
Feb-27-2014	220	100	4.0	880	750	1,500	8.5

Notes:

	Total Metals								
	Arsenic	Boron	Cadmium	Copper	Lead	Mercury	Molybdenum	Nickel	Zinc
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Jan-09-2014	5.5	9,000	<1.0	41	<2.5	100	31.0	17.0	<5.0
Feb-27-2014	<10		<1.0	<50	<2.5	<100	24.0	23.0	<10

Notes:

Figure 2. Monthly selenium discharges from the terminus of the San Luis Drain into Mud Slough compared to load values.

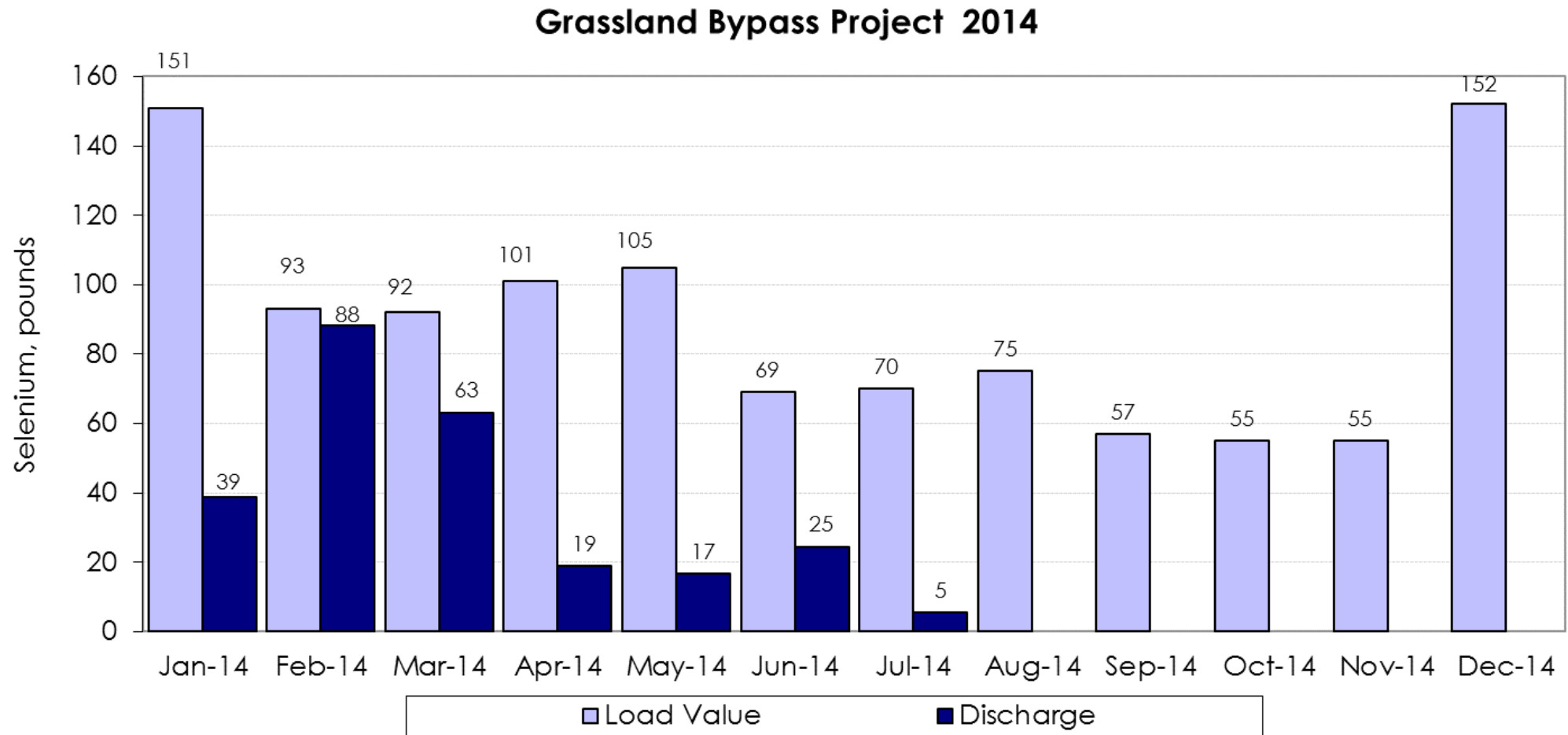


Table 3a. Water monitoring in Mud Slough (north) below San Luis Drain Discharge Station D

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jul-01-2014	7	27.4	8,610
Jul-02-2014	7	27.0	8,460
Jul-03-2014	10	27.0	8,350
Jul-04-2014	0	27.3	8,590
Jul-05-2014	0	26.4	8,930
Jul-06-2014	0	26.3	9,200
Jul-07-2014	0	25.0	9,290
Jul-08-2014	0	26.7	9,450
Jul-09-2014	0	27.0	9,580
Jul-10-2014	0	26.6	9,610
Jul-11-2014	7	27.1	9,540
Jul-12-2014	7	26.7	9,360
Jul-13-2014	9	27.0	8,940
Jul-14-2014	7	27.7	8,760
Jul-15-2014	0	27.5	8,870
Jul-16-2014	7	27.6	9,190
Jul-17-2014	7	27.4	9,600
Jul-18-2014	7	27.2	
Jul-19-2014	7	27.5	
Jul-20-2014	7	27.5	
Jul-21-2014	7	27.2	
Jul-22-2014	7	26.8	
Jul-23-2014	8	26.8	
Jul-24-2014	10	26.9	
Jul-25-2014	12	27.6	9,190
Jul-26-2014	10	27.7	7,970
Jul-27-2014	8	28.1	7,620
Jul-28-2014	0	27.1	7,680
Jul-29-2014	0	27.4	7,890
Jul-30-2014	0	27.6	8,210
Jul-31-2014	0	27.9	8,610

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Data

Table 3b. Monthly Averages

PARAMETER	Total Flow	Temperature	Specific Conductance
DATA SOURCE	Calculated	USGS	USGS
UNITS	acre-feet	°C	µS/cm
January	3,360	11	3,120
February	4,250	14	3,600
March	5,390	17	3,230
April	1,960	20	4,130
May	270	22	6,530
June	400	25	7,960
July	290	27	8,810
August			
September			
October			
November			
December			

Table 3c. Water quality monitoring in Mud Slough (north) below San Luis Drain discharge (Station D)

PARAMETER	Physicals					Total Selenium	Total Boron	Total Molybdenum
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity			
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE			
UNITS	mg/L	units	µS/cm	°C	NTU	ug/L	mg/L	ug/L
May-08-2014	16.4	8.5	6,040	22.6	22.5	14.3 U	8.2	24 U
May-16-2014	17.3	8.4	6,780	24.8	29.8	6.9	8.3	
May-23-2014	11.4	8.7	6,760	25.8	28.2	7.6	11.0	
May-30-2014	23.8	8.8	7,600	26.5		9.7	13.0	
Jun-06-2014	18.2	8.6	8,620	26.3	20.9	7.2	12.0	
Jun-13-2014	9.5	9.0	8,950	26.9		11.6	16.0	
Jun-20-2014	11.9	8.9	7,400	25.6	38.0	11.2	13.0	
Jun-26-2014	12.5	9.0	6,340	25.1	22.6	34.9 U	11.0	19
Jul-02-2014		9.0	8,740	27.9	29.8	16.9	17.0	
Jul-11-2014	6.7	8.5	9,710	30.5	13.8	12.7	20.0	
Jul-18-2014	5.2	8.7	10,000	26.9	9.2	9.9	21.0	
Jul-25-2014	7.9	9.0	9,210	27.4	14.6	10.2	20.0	
Jul-31-2014	7.4	8.7	9,000	29.2		9.8	19.0	11

Notes:

	Nutrients				
	Nitrates as N (dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total phosphorous as P	Ortho-phosphate as P
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	0.2	0.2	<5.0	0.12 V	0.046 T
Feb-27-2014	1.0 T	0.2 L	1.5	0.33 T	0.026
Mar-26-2014	0.02	0.2	2.5	0.62 T, U	0.220
Apr-25-2014					
May-08-2014	0.31	0.3	2.5	0.28 T	<0.010
Jun-26-2014	4.80 U	0.8 U	3.5 U	0.18	<0.050
Jul-31-2014	<0.02	0.2V	3.5 L, U	0.13	<0.010

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (dissolved)	Sulfate (dissolved)	Total Organic Carbon
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	120	76	6.5	400	470	650	NA
Feb-27-2014	110	75	6.0	480	480	670	11.0

Notes:

	Total Metals						
	Arsenic	Cadmium	Copper	Lead	Mercury	Nickel	Zinc
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Jan-09-2014	5.3	<1.0	29 L	<2.5	110	10.0	<5.0
Feb-27-2014	<5.0	<1.0	<50	<2.5	<100	16.0	<10

Notes:

Table 4. Water quality monitoring in Mud Slough (north) above the San Luis Drain (Station C)

	Physicals						
PARAMETER	Dissolved Oxygen	Specific Conductance	Turbidity	pH	Boron	Total Selenium	Molybdenum
DATA SOURCE	WSJRW	WSJRW	WSJRW	USBR	WSJRW	WSJRW	USBR
UNITS	mg/L	µS/cm	NTU	units	mg/L	µg/L	µg/L
May-08-2014							
May-16-2014							
May-23-2014							
May-30-2014	26.0	5,530		8.3	4.7 U		
Jun-06-2014							
Jun-13-2014							
Jun-20-2014	15.9	6,810	4.8	8.4	1.2	<0.4	
Jun-26-2014							
Jul-02-2014							
Jul-11-2014							
Jul-18-2014							
Jul-25-2014							
Jul-31-2014							

Notes:

- > Samples only collected when flow is sufficient.
- > May 30 very little flow during sample collection
- > June 20 very little flow during sample collection

Table 5. Water quality monitoring in Mud Slough (north) backwater below San Luis Drain discharge (Station I2)

PARAMETER	Physicals					Total Selenium
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity	
DATA SOURCE	USBR	USBR	USBR	USBR	USBR	USBR
UNITS	mg/L	units	µS/cm	°C	NTU	µg/L
May-08-2014						
May-16-2014						
May-23-2014						
May-30-2014						
Jun-06-2014						
Jun-13-2014						
Jun-20-2014						
Jun-26-2014						
Jul-02-2014						
Jul-11-2014						
Jul-18-2014						
Jul-25-2014						
Jul-31-2014						

Notes:

Samples collected only when site is flooded

Site was dry from May through July (no sample collected)

**Table 6a. Water monitoring in Salt Slough at Highway 165
Station F**

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jul-01-2014	37	28.3	1,020
Jul-02-2014	29	27.6	1,010
Jul-03-2014	30	27.4	1,040
Jul-04-2014	34	27.9	1,050
Jul-05-2014	32	27.2	998
Jul-06-2014	28	26.5	1,020
Jul-07-2014	28	25.6	1,040
Jul-08-2014	23	27.2	1,080
Jul-09-2014	25	27.6	955
Jul-10-2014	21	27.5	1,020
Jul-11-2014	17	26.6	1,060
Jul-12-2014	18	26.3	1,200
Jul-13-2014	20	26.8	1,270
Jul-14-2014	28	27.6	1,040
Jul-15-2014	33	27.0	1,030
Jul-16-2014	26	27.4	965
Jul-17-2014	19	26.6	1,040
Jul-18-2014	26	26.0	1,090
Jul-19-2014	25	27.1	996
Jul-20-2014	35	27.8	1,050
Jul-21-2014	43	26.7	1,060
Jul-22-2014	35	27.2	947
Jul-23-2014	31	26.4	1,040
Jul-24-2014	30	26.5	1,140
Jul-25-2014	31	27.1	1,180
Jul-26-2014	36	28.2	1,160
Jul-27-2014	30	28.8	1,110
Jul-28-2014	37	26.6	1,010
Jul-29-2014	31	26.2	945
Jul-30-2014	29	28.3	988
Jul-31-2014	37	29.5	1,010

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Data

Table 6b. Monthly Averages

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	Calculated	USGS	USGS
UNITS	acre-feet	°C	µS/cm
January	4,820	17	1,760
February	3,800	14	1,960
March	4,600	17	2,170
April	5,480	20	1,820
May	2,810	23	1,640
June	1,900	25	1,360
July	1,790	27	1,050
August			
September			
October			
November			
December			

Table 6c. Water quality monitoring in Salt Slough at Highway 165 (Station F)

PARAMETER	Physicals					Total Selenium	Total Boron	Total Molybdenum
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity			
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE			
UNITS	mg/L	units	µS/cm	°C	NTU	ug/L	mg/L	ug/L
May-08-2014	12.1	7.8	1,930	11.0	25.3	< 0.4	0.8	12
May-16-2014	10.9	7.1	1,808	22.5	31.6	< 0.4	0.7	
May-23-2014	11.0	8.3	1,770	27.2	23.8	< 0.4	0.7	
May-30-2014	10.8	7.6	1,580	24.9		< 0.4	0.6	
Jun-06-2014								
Jun-13-2014	9.8	7.4	1,490	24.5		< 0.4	0.6	
Jun-20-2014	10.3	7.4	1,420	24.0	53.7	< 0.4	0.6	
Jun-26-2014	9.7	7.9	1,300	23.6	51.9	0.4	0.4	10
Jul-02-2014		7.4	1500	25.4	78.9	< 0.4	0.3	
Jul-11-2014	7.2	8.1	1080	27.1	74.2	< 0.4	0.4	
Jul-18-2014	9.0	7.6	1110	23.6	68.0	< 0.4	0.4	
Jul-25-2014	7.6	7.6	1060	25.6	74.6	0.4	0.5	
Jul-31-2014	7.3	8.3	1070	29.0		< 0.4	0.4	7

Notes:

	Nutrients				
	Nitrates as N (dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total phosphorous	Ortho-phosphate as P
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	<10	0.3	0.8	0.095 L,V	0.050 T
Feb-27-2014	1.3 T	0.3 L	1.0	0.320 T	<0.010
Mar-26-2014	0.8	0.1	1.0	0.290 T	0.057
Apr-25-2014					
May-08-2014	0.5	0.1	0.7	0.21 T	0.1
Jun-26-2014	0.5	< 0.5	0.5	0.26	0.1
Jul-31-2014	0.5	0.1 V	1.3	0.22	0.1

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (dissolved)	Sulfate (dissolved)	Total Organic Carbon
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	68	40	4.2	220	290	230	NA
Feb-27-2014	85	53	4.6	310	360	280	5.4

Notes:

	Total Metals							
	Arsenic	Cadmium	Copper	Lead	Mercury	Molybdenum	Nickel	Zinc
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Jan-09-2014	<5.0	<1.0	18	<2.5	110	9.4	<10	5.3
Feb-27-2014	<5.0	<1.0	<50	<2.5	<100	12.0	11	<10

Notes:

**Table 7a. Water quality monitoring in Grasslands Wetlands Water Supply Channels
Station J Camp 13 Ditch headworks**

PARAMETER	Flow	Specific Conductance	Temperature	Total Selenium
DATA SOURCE	GWD	USBR	GWD	USBR
UNITS	cfs	µS/cm	°C	µg/L
May-08-2014	<20			
May-16-2014	<20			
May-23-2014	<20			
May-30-2014	<20			
Jun-06-2014	<20			
Jun-13-2014	<20			
Jun-20-2014	<20			
Jun-26-2014	<20			
Jul-02-2014	<20			
Jul-11-2014	<20			
Jul-18-2014	<20			
Jul-25-2014	<20			
Jul-31-2014	<20			

Notes:

Samples only collected when flow is passing site. Flow of less than 20 cfs does not reach Site C.
May, June, and July: Flow <20 cfs (no sample collected)

**Table 7b. Water quality monitoring in Grasslands Wetlands Water Supply Channels
Station K2 Agatha Canal headworks**

PARAMETER	Flow	Specific Conductance	Temperature	Total Selenium
DATA SOURCE	GWD	USBR	GWD	USBR
UNITS	cfs	µS/cm	°C	µg/L
May-08-2014	<20			
May-16-2014	<20			
May-23-2014	<20			
May-30-2014	<20			
Jun-06-2014	<20			
Jun-13-2014	<20			
Jun-20-2014	<20			
Jun-26-2014	<20			
Jul-02-2014	<20			
Jul-11-2014	<20			
Jul-18-2014	<20			
Jul-25-2014	<20			
Jul-31-2014	<20			

Notes:

Samples only collected when flow is passing site. Flow of less than 20 cfs does not reach Site C.
May, June, and July: Flow <20 cfs (no sample collected)

Table 8a. Water monitoring in the San Joaquin River above Merced River Station H2

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jul-01-2014	34	28.9	2,610
Jul-02-2014	34	28.2	2,050
Jul-03-2014	29	27.8	2,410
Jul-04-2014	29	27.5	2,960
Jul-05-2014	29	26.7	2,470
Jul-06-2014	28	26.3	2,090
Jul-07-2014	27	25.0	1,950
Jul-08-2014	27	25.9	2,010
Jul-09-2014	25	27.5	2,430
Jul-10-2014	26	27.3	2,700
Jul-11-2014	26	26.6	2,700
Jul-12-2014	25	25.9	2,860
Jul-13-2014	24	26.3	3,250
Jul-14-2014	22	27.9	3,290
Jul-15-2014	24	27.9	2,740
Jul-16-2014	24	28.0	1,960
Jul-17-2014	22	27.1	1,990
Jul-18-2014	20	26.9	2,370
Jul-19-2014	22	27.2	2,700
Jul-20-2014	22	27.2	2,290
Jul-21-2014	26	26.5	2,110
Jul-22-2014	27	26.6	1,760
Jul-23-2014	25	26.5	1,740
Jul-24-2014	24	26.1	2,070
Jul-25-2014	25	27.2	2,680
Jul-26-2014	25	27.9	3,050
Jul-27-2014	26	28.3	2,640
Jul-28-2014	25	27.5	2,430
Jul-29-2014	27	28.4	2,070
Jul-30-2014	23	28.3	1,910
Jul-31-2014	22	29.0	1,920

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Data

Table 8b. Monthly Averages

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	Calculated	USGS	USGS
UNITS	acre-feet	°C	µS/cm
January	11,780	13	2,600
February	12,100	14	2,580
March	13,040	17	2,680
April	10,030	20	2,590
May	4,100	23	3,170
June	2,250	25	3,195
July	1,570	27	2,390
August			
September			
October			
November			
December			

Table 9. Water quality monitoring in the San Joaquin River above Merced River at China Island Refuge Station R

PARAMETER	Physicals					Total Selenium	Total Boron	Total Molybdenum
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity			
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE			
UNITS	mg/L	units	µS/cm	°C	NTU	ug/L	mg/L	ug/L
May-08-2014	16.7	8.3	3,620	21.9	14.9	2.7 U	2.4	16
May-16-2014	16.6	8.2	3,610	24.6	27.8	0.9	2.1	
May-23-2014	11.6	8.5	3,340	27.1	24.9	0.9	2.2	
May-30-2014	13.2	8.5	3,580	27.2		1.0	2.4	
Jun-06-2014	22.1	8.4	4,480	26.4	15.8	0.5	2.2	
Jun-13-2014	11.9	8.5	2,120	27.5		< 0.4	0.8	
Jun-20-2014	11.3	8.3	3,160	26.7	46.1	1.6	2.7	
Jun-26-2014	15.6	8.8	3,630	26.0	64.3	P	3.4	14
Jul-02-2014		8.6	2,090	28.2	40.1	1.5	1.2	
Jul-18-2014	8.4	8.3	2,830	26.3	18.1	0.6	1.8	
Jul-25-2014	8.2	8.3	2,830	26.6	26.3	0.8	3.1	

Notes:

	Nutrients				
	Nitrates as N (Dissolved)	Total ammonia	Total Kjeldahl Nitrogen	Total phosphorous	Ortho-phosphate as P
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	0.16	0.098	0.85	0.16V	0.054 T
Feb-27-2014					
Mar-26-2014	0.05	0.110	2.00	0.53 T	0.150
Apr-25-2014					
May-08-2014	<0.01	0.051	1.00	0.20 T	<0.010
Jun-26-2014	<1.00	<0.50	1.60	0.30	<0.050

Notes: No nutrients, general minerals or total minerals collected at Site R in February due to unsafe site conditions

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals							
	Calcium	Magnesium	Potassium	Sodium	Chloride (Dissolved)	Sulfate (Dissolved)	Total Organic Carbon	Total Dissolved Solids
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Units	mg/L
Jan-09-2014	91	59	5.1	310	430	430	NA	NA
Feb-27-2014								

Notes: No nutrients, general minerals or total minerals collected at Site R in February due to unsafe site conditions

	Total Metals								
	Arsenic	Boron	Cadmium	Copper	Lead	Mercury	Molybdenum	Nickel	Zinc
	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE	DATA SOURCE
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Jan-09-2014	<5.0	1,800	<1.0	23	<2.5	<100	12	<10	<5.0
Feb-27-2014									

Notes: No nutrients, general minerals or total minerals collected at Site R in February due to unsafe site conditions

Table 10a. Water monitoring in the San Joaquin River at Fremont Ford (Stati

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jul-01-2014		28.6	1,470
Jul-02-2014		28.3	1,520
Jul-03-2014		27.8	1,770
Jul-04-2014		27.7	1,530
Jul-05-2014		27.1	1,550
Jul-06-2014		26.8	1,600
Jul-07-2014		24.8	1,730
Jul-08-2014		27.6	1,720
Jul-09-2014		27.8	1,750
Jul-10-2014		27.3	2,180
Jul-11-2014		26.3	2,290
Jul-12-2014		26.2	
Jul-13-2014		26.8	
Jul-14-2014		27.7	1,840
Jul-15-2014		28.4	1,570
Jul-16-2014		28.0	1,610
Jul-17-2014		26.8	
Jul-18-2014		27.3	
Jul-19-2014		27.6	1,120
Jul-20-2014		27.5	1,470
Jul-21-2014		27.0	1,370
Jul-22-2014		27.0	1,300
Jul-23-2014		26.8	1,430
Jul-24-2014		27.0	1,610
Jul-25-2014		27.8	1,630
Jul-26-2014		28.1	1,520
Jul-27-2014		28.6	1,440
Jul-28-2014		27.2	1,470
Jul-29-2014		27.6	1,230
Jul-30-2014		28.7	1,400
Jul-31-2014		29.1	1,450

Notes:

See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Data

Table 10b. Monthly Averages

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	Calculated	USGS	USGS
UNITS	acre-feet	°C	µS/cm
January	6,310	10	1,990
February	6,040	14	2,150
March	6,900	17	2,270
April	6,670	20	2,230
May	2,770	23	2,310
June		25	2,040
July		27	1,580
August			
September			
October			
November			
December			

Table 11a. Water monitoring in the San Joaquin River at Crows Landing (Station N)

PARAMETER	Flow	Temperature	Specific Conductance	Total Selenium
DATA SOURCE	USGS	USGS	USGS	USBR
UNITS	cfs	°C	µS/cm	µg/L
Jul-01-2014	85	27.9	2,080	1.6
Jul-02-2014	80	27.5	2,100	1.4
Jul-03-2014	66	27.4	2,120	1.1
Jul-04-2014	62	26.9	1,970	0.9
Jul-05-2014	69	26.1	2,010	0.8
Jul-06-2014	74	25.7	2,060	1.0
Jul-07-2014	79	24.6	1,840	0.7
Jul-08-2014	83	25.0	1,360	0.5
Jul-09-2014	75	27.4	1,520	0.7
Jul-10-2014	78	26.8	1,490	0.7
Jul-11-2014	85	26.1	1,610	0.6
Jul-12-2014	87	25.6	1,660	0.7
Jul-13-2014	91	25.9	1,750	0.5
Jul-14-2014	77	27.4	1,750	0.7
Jul-15-2014	83	27.4	1,480	0.4
Jul-16-2014	82	27.1	1,420	< 0.4
Jul-17-2014	65	26.5	1,520	0.5
Jul-18-2014	58	26.3	1,550	0.7
Jul-19-2014	70	25.9	1,700	0.6
Jul-20-2014	67	26.6	1,670	0.7
Jul-21-2014	62	25.8	1,670	0.7
Jul-22-2014	62	26.0	1,530	0.7
Jul-23-2014	54	26.0	1,530	0.7
Jul-24-2014	58	25.6	1,520	0.6
Jul-25-2014	48	26.7	1,500	0.6
Jul-26-2014	58	26.9	1,590	0.6
Jul-27-2014	56	27.4	1,700	0.9
Jul-28-2014	57	27.1	1,880	0.7
Jul-29-2014	48	26.8	1,800	0.7
Jul-30-2014	52	26.8	1,750	0.6
Jul-31-2014	46	27.4	1,700	0.7

Notes:

Preliminary Data

11b. Monthly Averages

PARAMETER	Flow	Temperature	Specific Conductance	Selenium
DATA SOURCE	Calculated	Calculated	Calculated	Calculated
UNITS	acre-feet	°C	µS/cm	µg/L
January	22,200	10	1,620	0.7
February	22,450	13	1,760	1.3
March	22,480	17	2,180	1.1
April	11,060	20	1,710	0.5
May	21,700	17	2,110	1.1
June	6,040	25	1,880	0.8
July	4,200	27	1,700	0.8
August				
September				
October				
November				
December				

Table 11c. Water quality monitoring in the San Joaquin River at Crows Landing (Station N)

PARAMETER	Physicals					Selenium	Boron	Molybdenum
	Dissolved Oxygen	pH	Specific Conductance	Temperature	Turbidity			
DATA SOURCE	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR
UNITS	mg/L	units	µS/cm	°C	NTU	µg/L	mg/L	mg/L
May-08-2014	12.6	8.1	2,030	20.0	16.2	1.2	1.2	7.5
May-16-2014	13.2	8.1	2,110	21.8	14.7	0.7	1.1	
May-23-2014	11.7	8.5	1,800	25.7	20.6	0.5	0.8	
May-30-2014	15.6	8.2	1,740	23.9		0.5	1.1	
Jun-06-2014	18.0	8.0	1,780	26.6	22.9	0.6	0.8	
Jun-13-2014	9.3	8.6	1,570	24.2		0.4	0.6	
Jun-20-2014	13.4	8.1	2,020	23.4	20.7	0.5	1.1	
Jun-26-2014	18.0	8.4	2,120	24.2	22.9	1.3	1.5	7.9
Jul-11-2014	7.7	8.1	1,730	27.0	35.8	0.7	1.0	
Jul-18-2014	8.2	8.2	1,620	26.1	80.3	0.6	0.8	
Jul-25-2014	8.4	8.0	1,560	26.9	27.2	0.5	0.8	
Jul-31-2014	7.7	8.3	1,850	28.8		0.8	1.0	6.2

Notes:

Table 12. Summary of fathead minnow (*Pimephales promelas*) larvae survival in 7-day tests using water samples collected from March 2014 to March 2016. Each value is the mean of 4 replicates with 10 fish in each replicate.

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal	Laboratory Control
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	%	%	%	%	%	%
Mar-2014	90	93	98	93	73 ^a	95
Jun-2014	95	98	88	98	95	95
Sep-2014						
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Table 13. Summary of fathead minnow (*Pimephales promelas*) larvae growth in 7-day tests using water samples collected from March 2014 to March 2016. Each value is the mean of 4 replicates with 10 fish in each replicate.

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal	Laboratory Control
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	mg	mg	mg	mg	mg	mg
Mar-2014	0.84	0.70	0.78	0.68	0.74	0.74
Jun-2014	0.67	0.62	0.75	0.83	0.62	0.67
Sep-2014						
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Table 14. Summary of *Daphnia magna* survival in 7-day tests using water samples collected from March 2014 to March 2016. Each value is the mean of 10 replicates with 1 animal in each replicate.

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal	Laboratory Control
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	%	%	%	%	%	%
Mar-2014	100	90	100	100	100	100
Jun-2014	100	100	90	20*	90	80
Sep-2014						
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Table 15. Summary of *Daphnia magna* reproduction in 7-day tests using water samples collected from March 2014 to March 2016. Each value is the mean of 10 replicates with 1 animal in each replicate.

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal	Laboratory Control
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	neonates per female	neonates per female	neonates per female	neonates per female	neonates per female	neonates per female
Mar-2014	67.4*	72.3	86.9	88.8	85.0	82.9
Jun-2014	72.4	88.1	53.1*	41.7*	68.8	61.3
Sep-2014						
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Table 16. Summary of *Selenastrum capricornutum* growth in 4-day tests using water samples collected from March 2014 to March 2016. Each value is the mean of 4 replicates.

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal	Laboratory Control
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	10 ⁵ cells/mL	10 ⁵ cells/mL	10 ⁵ cells/mL	10 ⁵ cells/mL	10 ⁵ cells/mL	10 ⁵ cells/mL
Mar-2014	4.2*	7.2	7.9	7.7 ^a	7.3	4.1
Jun-2014	2.2*		2.8*	5.4*	6.2	4.2
Sep-2014						
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Table 17. Summary of selenium concentrations in grab water samples collected at study stations for use in laboratory toxicity tests

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal
DATA SOURCE	SLDMWA/USBR	SLDMWA/USBR	SLDMWA/USBR	SLDMWA/USBR	SLDMWA/USBR
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L
17-Mar-14	18	< 0.8	1.3	0.5	< 0.4
19-Mar-14	18	< 0.8	1.5	0.5	< 0.4
21-Mar-14	18	< 0.8	1.7	0.4	< 0.4
9-Jun-14	16	< 0.8	7.2	< 0.4	< 0.4
11-Jun-14	15	< 0.8	3.3	< 0.4	< 0.4
13-Jun-14	15	< 0.8	10.9	< 0.4	< 0.4
Sep-2014					
Nov-2014					
Mar-2015					
Jun-2015					
Sep-2015					
Mar-2016					

Table 18. Summary of total suspended solids concentrations in grab water samples collected at study stations for use in laboratory toxicity tests

See Table 19 for explanation of footnotes and agency abbreviations.

LOCATION	Station B	Station C	Station D	Station F	Delta Mendota Canal
DATA SOURCE	SLDMWA	SLDMWA	SLDMWA	SLDMWA	SLDMWA
UNITS	mg/L	mg/L	mg/L	mg/L	mg/L
17-Mar-14	87 **	61	79	60	6.0
19-Mar-14	< 5.0 T,V **	69 T,V	62 T,V	62 T,V	5.8 T,V
21-Mar-14	46	64	59	58	6.0
9-Jun-14	50 T	58 T	31 T	24 T	<0.5 T
11-Jun-14	51 T	49	16 T	110	23.0
13-Jun-14	47	39	57	<0.5 T	<0.5 T
Sep-2014					
Nov-2014					
Mar-2015					
Jun-2015					
Sep-2015					
Mar-2016					

Table 19. Explanations of footnotes and agency abbreviations.

Agency	
CVRWQCB	California Regional Water Quality Control Board, Central Valley Region
GWD	Grasslands Water District
SLDMWA	San Luis & Delta-Mendota Water Authority
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey
WSJRWC	Westside San Joaquin River Watershed Coalition (WSJRWC)
Water Quality Monitoring	
e	Estimated value
.	Not applicable
<	Less than MDL
D	Sample was dechlorinated
G	Data from records of the Grassland Water District.
H	Result may have high bias
J	Result is between the MDL and RL
L	Result may have low bias
MDL	Minimum detection level
	Not analyzed - operator error, data will not be available in the future
NP	Not Provided. Data may be available in the future.
NT	Not tested
P	Pending, data not available at this time but will be available in the future
RL	Reporting level
T	Result obtained past the holding time
U	Result determined to be an outlier at the time of data validation
V	Result may vary excessively from the true value
UA3	Use Agreement for Continued Use of the San Luis Drain January 2010 - December 2019
Toxicity	
*	Significantly reduced from Delta Mendota Canal ($p < 0.05$)
**	Sample re-analyzed and result confirmed.
L	Result may be biased low. Sample was not preserved in the field
†	DMC water failed to meet the survival (>80%) acceptability criteria.
†††	DMC water failed to meet the reproduction (>10 neonates/adult) acceptability criteria.
††††	DMC water failed to meet minimum growth (10^6 cell/mL) acceptability criteria.
‡	Control value exceeds suggested maximum variance (20%) acceptability criteria.
‡‡	Fungal growth observed on test organisms.
‡‡‡	Failed cell density requirement of $1E6$ cells.
#	New testing laboratory with reporting limit of $0.4 \mu\text{g/L}$ as of June 1998.
v	Based on definitive bioassay, NOEC is 50 percent
a	The growth response for one of the replicates at this test treatment was determined