Grassland Bypass Project
Interim Baseline Monitoring Program

Monthly Data Report

October 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

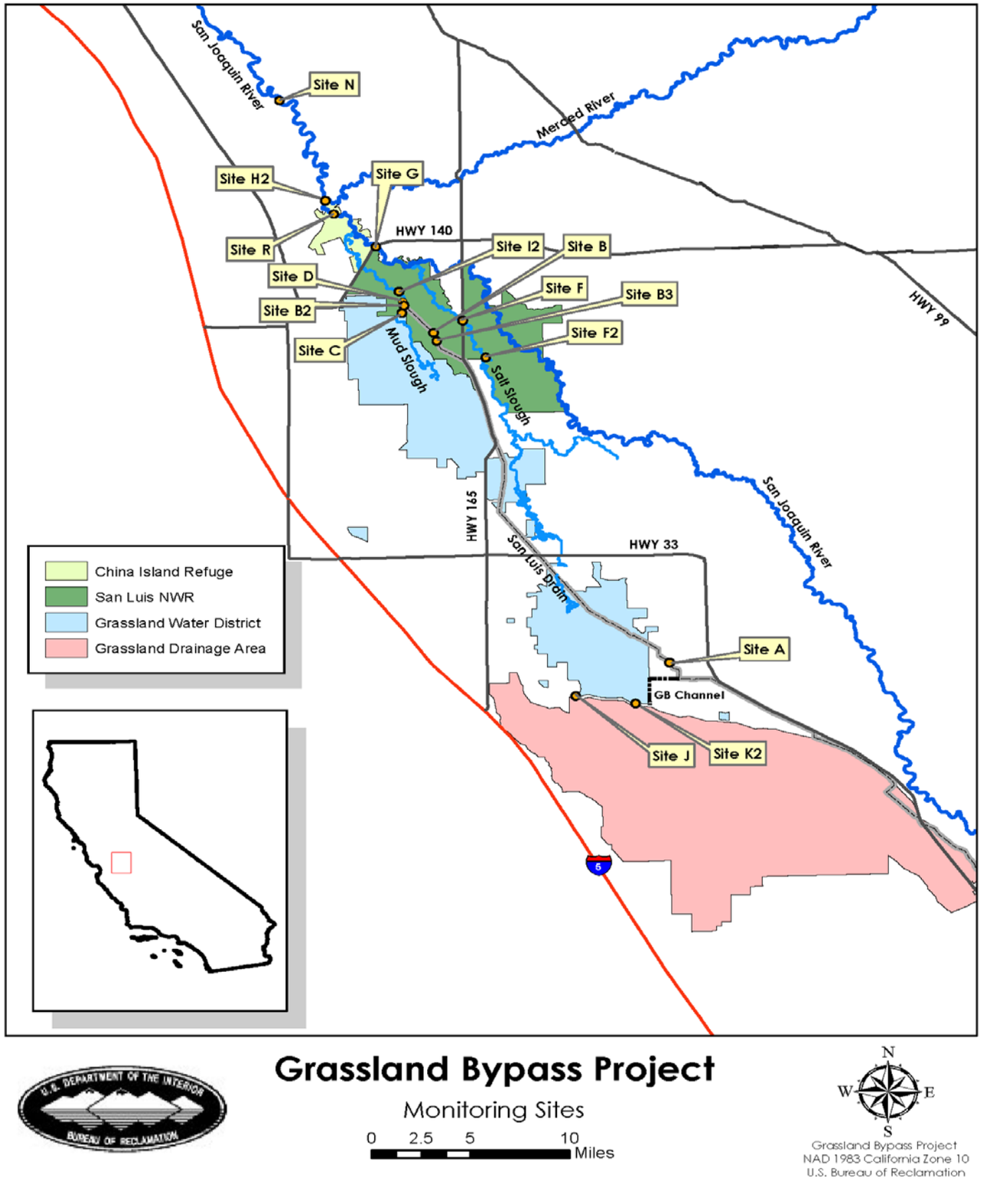
San Luis & Delta-Mendota Water Authority

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
MONTHLY DATA REPORT

LIST OF TABLES FOR MONTHLY REPORT

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
Oct-01-2014	0	19.9	10,100	7,465		8	0
Oct-02-2014	0	19.9	10,500	7,775		10	0
Oct-03-2014	0	21.3	10,700	7,929		10	0
Oct-04-2014	0	21.1	10,800	8,004		10	0
Oct-05-2014	0	20.9	11,200	8,279		8	0
Oct-06-2014	0	20.7	11,800	8,760		8	0
Oct-07-2014	0	20.3	10,600	7,813		8	0
Oct-08-2014	0	21.2				8	0
Oct-09-2014	0	21.5				8	0
Oct-10-2014	0	21.3				8	0
Oct-11-2014	0	21.4				8	0
Oct-12-2014	0	20.9				8	0
Oct-13-2014	0	22.0	6,040	4,469		8	0
Oct-14-2014	0	20.3	9,010	6,667		8	0
Oct-15-2014	0	19.6	8,750	6,479		8	0
Oct-16-2014	0	19.6	8,880	6,571		8	0
Oct-17-2014	0	19.1	9,070	6,710		8	0
Oct-18-2014	0	19.5	9,250	6,843		8	0
Oct-19-2014	0	19.5	9,340	6,914		8	0
Oct-20-2014	0	19.0	9,540	7,059		8	0
Oct-21-2014	0	15.2	7,530	5,571		8	0
Oct-22-2014	0	14.4	6,160	4,559		8	0
Oct-23-2014	0	17.3	10,500	7,799		8	0
Oct-24-2014	0	18.4	11,100	8,226		8	0
Oct-25-2014	0	15.7	10,000	7,431		8	0
Oct-26-2014	0	15.0	10,400	7,669		8	0
Oct-27-2014	0	14.9	8,030	5,939		8	0
Oct-28-2014	0	15.8	7,110	5,263		8	0
Oct-29-2014	0	16.9	7,300	5,401		8	0
Oct-30-2014	0	16.6	7,530	5,573		8	0
Oct-31-2014	6	17.5	6,850	5,072		8	75

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 Conducantce	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
Aug-2014	15	25.1	6,810	3,037	87		119	5,373
Sep-2014	10	23.2	7,910	5,854	59		40	2,838
Oct-2014	10	18.9	9,160	6,779		9	40	2,180
Cumulative Total	3,675						24,249	53,232

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
Oct-01-2014	0	22.1	15,400		27.0	7.6	0.0
Oct-02-2014	0	21.9	15,100		33.0	8.1	0.0
Oct-03-2014	0	23.3	15,100		31.0	9.0	0.0
Oct-04-2014	0	23.6	15,000		30.0	12.2	0.0
Oct-05-2014	0	24.0	15,000		31.0	12.4	0.0
Oct-06-2014	0	24.4	14,900		32.0	14.4	0.0
Oct-07-2014	0	23.8	15,100		31.0	14.0	0.0
Oct-08-2014	0	23.4	15,000		29.0	12.9	0.0
Oct-09-2014	0	22.9	15,000		31.0	15.0	0.0
Oct-10-2014	0	20.9	15,000		31.0	21.7	0.0
Oct-11-2014	0	21.8	15,100		33.0	27.7	0.0
Oct-12-2014	0	22.0	15,200		30.0	22.6	0.0
Oct-13-2014	0	22.1	15,400	99	32.0	15.4	0.0
Oct-14-2014	0	21.7	15,700		31.0	9.9	0.0
Oct-15-2014	0	19.4	15,600		32.0	11.0	0.0
Oct-16-2014	0	19.1	15,400		32.0	10.9	0.0
Oct-17-2014	0	18.9	15,500		32.0	10.0	0.0
Oct-18-2014	0	19.0	15,600		36.0	11.0	0.0
Oct-19-2014	0	20.5	15,600		34.0	13.0	0.0
Oct-20-2014	0	19.6	15,600	60	33.0	12.3	0.0
Oct-21-2014	1	15.9	15,600		34.0	13.2	0.1
Oct-22-2014	1	16.9	15,600		30.0	11.2	0.1
Oct-23-2014	2	18.6	15,600		30.0	11.7	0.1
Oct-24-2014	2	19.2	15,800		28.0	11.2	0.1
Oct-25-2014	2	17.7	15,700		31.0	11.2	0.1
Oct-26-2014	2	15.4	15,500		28.0	12.3	0.1
Oct-27-2014	2	14.7	15,400	98	26.0	12.7	0.1
Oct-28-2014	2	16.3	15,200		28.0	13.8	0.1
Oct-29-2014	2	18.1	15,000		26.0	14.6	0.2
Oct-30-2014	2	17.1	14,500		27.0	13.0	0.2
Oct-31-2014	3	16.7	14,000		25.0	12.1	0.2

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 Conducantce (B2)	Average Total Supspended 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
Aug-2014	21	26.1	11,400	43	25.5	10.1	1	75
Sep-2014	10	24.1	14,200	66	29.3	11.7	0	57
Oct-2014	20	20.0	15,300	86	30.5	13.2	1	55
Cumulative Load Totals	4,671						258	868

Notes:
Selenium load objective based on 2014 critical year type

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

	Physicals					Total Selenium	Total Boron	Total Molybdenum
PARAMETER	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	ug/L	mg/L	ug/L
Aug-07-2014	7.2	8.4	10,600	28.0	9.8	10	24	
Aug-15-2014	9.2	7.8	11,200	24.5	14.5	10	27	
Aug-22-2014	9.4	8.2	12,000	26.8		9	28	
Sep-04-2014	9.6	8.3	13,000	23.9	21.1	9	30	6.2
Sep-19-2014	10.3	8.1	12,300	23.5	56.7	7	27	
Sep-26-2014	12.4	8.2	12,200	21.7	83.3	8	27	
Oct-03-2014	11.8	8.2	12,400	20.1		9	28	
Oct-10-2014	9.5	9.5	14,300	22.1	47.0	9	38	
Oct-17-2014		8.1	12,100	20.1	135.0	15	29	
Oct-24-2014	9.8	7.9	11,400	16.9	79.6	11	29	
Oct-31-2014	9.2	8.4	9,910	18.6	75.7	12	20	9.0

Notes:

	Nutrients				
	Nitrates as N (Dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total Phosphorous as P	Ortho-phosphate as P
	USBR	USBR	USBR	USBR	USBR
	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
Aug-31-2014					
Sep-04-2014	< 0.05	0.1	3.9	0.130 T	< 0.010 T
Oct-31-2014	< 0.80	< 0.5	6.7 U	0.350 U	< 2.00

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (Dissolved)	Sulfate (Dissolved)	Total Organic Carbon
	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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
	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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.

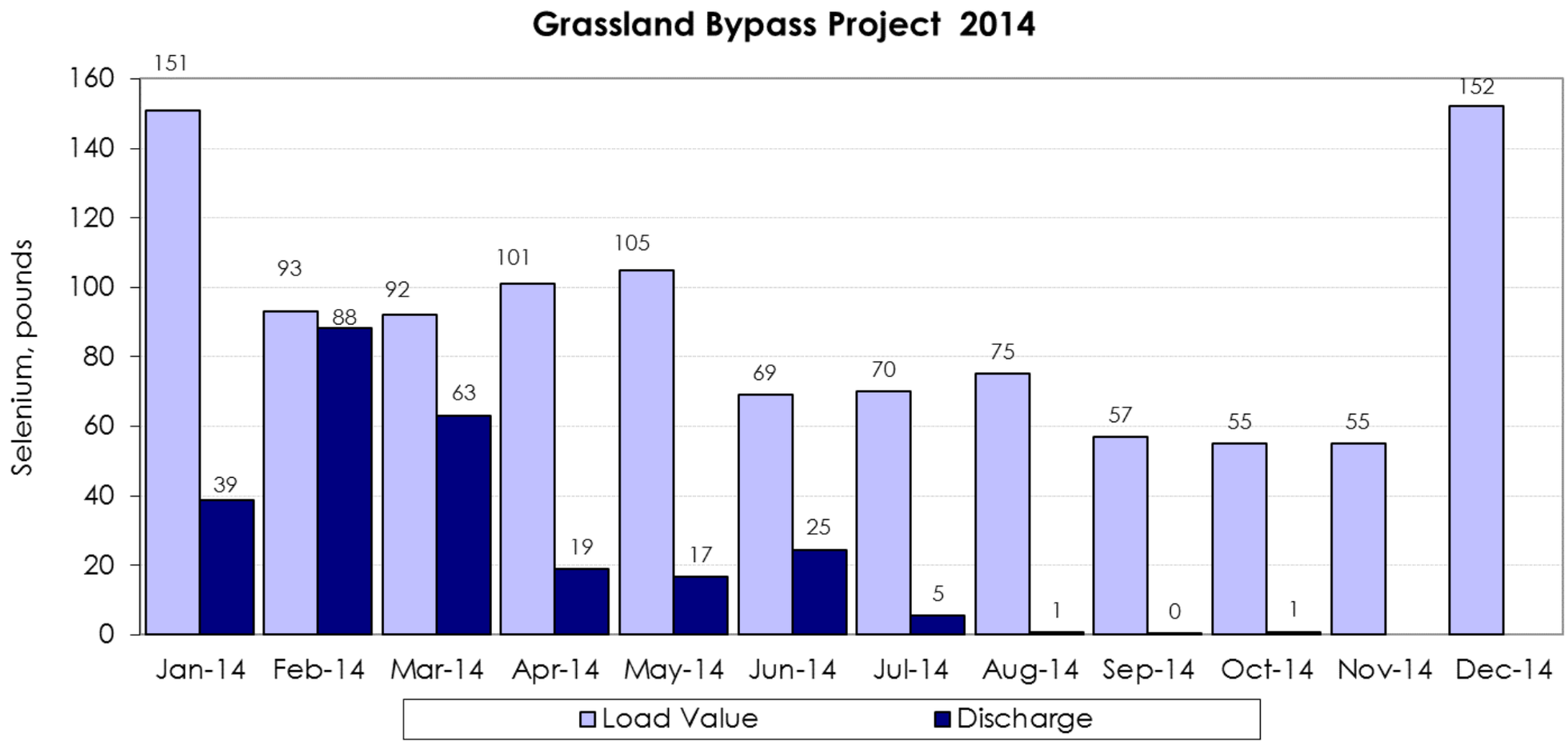


Table 3a. Water monitoring in Mud Slough (north) below San Luis Drain Discharge Station D

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Oct-01-2014	1	20.2	1,710
Oct-02-2014	1	20.2	1,550
Oct-03-2014	2	20.8	1,560
Oct-04-2014	3	20.9	1,380
Oct-05-2014	3	21.1	1,610
Oct-06-2014	3	21.7	1,420
Oct-07-2014	4	21.7	1,310
Oct-08-2014	4	21.3	1,310
Oct-09-2014	4	20.7	1,450
Oct-10-2014	4	20.4	1,490
Oct-11-2014	4	20.5	1,480
Oct-12-2014	5	19.8	1,470
Oct-13-2014	5	19.1	1,530
Oct-14-2014	9	20.1	1,160
Oct-15-2014	5	19.6	1,380
Oct-16-2014	5	19.2	1,480
Oct-17-2014	5	18.7	1,730
Oct-18-2014	7	18.6	1,690
Oct-19-2014	7	19.3	1,540
Oct-20-2014	7	19.4	1,850
Oct-21-2014	9	18.0	2,410
Oct-22-2014	10	17.1	2,630
Oct-23-2014	9	17.6	3,240
Oct-24-2014	8	18.0	3,990
Oct-25-2014	7	17.9	4,050
Oct-26-2014	7	16.9	3,660
Oct-27-2014	8	15.5	3,920
Oct-28-2014	12	15.7	3,140
Oct-29-2014	11	16.4	3,170
Oct-30-2014	8	16.5	3,870
Oct-31-2014	8	16.8	4,000

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	20	26	6,200
September	60	24	2,060
October	360	19	2,200
November			
December			

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

	Physicals					Total Selenium	Total Boron	Total Molybdenum
PARAMETER	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	ug/L	mg/L	ug/L
Aug-07-2014	10.1	8.2	6,680	27.2	11.3	3.7	12.0	
Aug-15-2014	10.6	8.3	4,160	24.9	51.9	1.6	4.6	
Aug-22-2014	8.8	8.3	5,810	27.1		2.0	6.6	
Sep-04-2014	10.0	8.2	7,150	24.5	22.7	3.5	14.0	11
Sep-19-2014	10.0	8.6	1,420	28.7	9.7	0.7	1.9	
Sep-26-2014	13.3	8.1	1,590	21.8	12.9	0.7	1.9	
Oct-03-2014	11.7	8.2	1,650	21.6		< 0.4	1.6	
Oct-10-2014	10.9	8.0	1,600	21.5	13.1	0.5	1.4	
Oct-17-2014		7.9	1,750	20.6	9.8	0.5	1.6	
Oct-24-2014	10.1	7.8	4,000	17.4	16.3	1.5	6.6	
Oct-31-2014	8.5	7.9	4,010	17.5	20.6	2.2	6.2	22

Notes:

	Nutrients				
	Nitrates as N (dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total phosphorous as P	Ortho-phosphate as P
	USBR	USBR	USBR	USBR	USBR
	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
Aug-31-2014					
Sep-04-2015	<0.02	0.1	2.6	0.20 T	<0.010 T
Oct-31-2014	<0.40	<0.5	1.6	0.46	<1.000

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (dissolved)	Sulfate (dissolved)	Total Organic Carbon
	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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
	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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	WSJRWC	WSJRWC	WSJRWC	USBR	WSJRWC	WSJRWC	USBR
UNITS	mg/L	µS/cm	NTU	units	mg/L	µg/L	µg/L
Aug-07-2014							
Aug-15-2014							
Aug-22-2014							
Sep-04-2014							
Sep-19-2014							
Sep-26-2014							
Oct-03-2014							
Oct-10-2014	12.3	1,360	11	7.9	0.9	0.4	
Oct-17-2014	NA	1,670	37	7.9	1.1	< 0.4	
Oct-24-2014							
Oct-31-2014	9.8	2,130	11	7.9	1.6	< 0.4	25U

Notes:

> Samples only collected when flow is sufficient.

> No samples collected in August or September due to lack of sufficent flow

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

	Physicals					
PARAMETER	**Dissolved Oxygen**	**pH**	**Specific Conductance**	**Temperature**	**Turbidity**	**Total Selenium**
DATA SOURCE	**USBR**	**USBR**	**USBR**	**USBR**	**USBR**	**USBR**
UNITS	**mg/L**	**units**	**µS/cm**	**°C**	**NTU**	**µg/L**
Aug-07-2014						
Aug-15-2014						
Aug-22-2014						
Sep-04-2014						
Sep-19-2014						
Sep-26-2014						
Oct-03-2014						
Oct-10-2014						
Oct-17-2014						
Oct-24-2014						
Oct-31-2014						

Notes:
Samples collected only when site is flooded
Site was dry from August through October (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
Oct-01-2014	18	20.6	1,340
Oct-02-2014	21	19.9	1,370
Oct-03-2014	20	21.4	1,400
Oct-04-2014	20	21.7	1,430
Oct-05-2014	21	21.8	1,400
Oct-06-2014	20	22.2	1,320
Oct-07-2014	19	22.4	1,330
Oct-08-2014	19	21.6	1,380
Oct-09-2014	18	21.0	1,420
Oct-10-2014	17	21.0	1,460
Oct-11-2014	16	20.9	1,560
Oct-12-2014	13	20.1	1,680
Oct-13-2014	14	19.1	1,710
Oct-14-2014	17	20.1	1,750
Oct-15-2014	17	19.4	1,660
Oct-16-2014	21	18.9	1,670
Oct-17-2014	20	19.3	1,610
Oct-18-2014	19	19.1	1,550
Oct-19-2014	17	19.3	1,610
Oct-20-2014	19	19.7	1,620
Oct-21-2014	19	17.8	1,580
Oct-22-2014	18	16.7	1,720
Oct-23-2014	17	17.7	1,740
Oct-24-2014	14	18.0	1,780
Oct-25-2014	21	17.8	1,840
Oct-26-2014	22	16.4	1,850
Oct-27-2014	22	15.3	1,780
Oct-28-2014	22	15.3	1,740
Oct-29-2014	26	16.1	1,740
Oct-30-2014	27	16.7	1,710
Oct-31-2014	27	16.6	1,720

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	1,880	26	923
September	1,620	24	1,100
October	1,190	23	1,200
November			
December			

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

	Physicals					Total Selenium	Total Boron	Total Molybdenum
PARAMETER	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	ug/L	mg/L	ug/L
Aug-07-2014	8.2	7.6	941	25.9	78.2	< 0.4	0.4	
Aug-15-2014	10.4	8.7	976	25.0	61.0	< 0.4	0.4	
Aug-22-2014	10.3	7.6	868	25.5		< 0.4	0.3	
Sep-04-2014	9.8	7.4	858	24.2	71.0	< 0.4	0.4	5
Sep-19-2014	11.5	7.8	1,210	24.0	40.4	< 0.4	0.6	
Sep-26-2014	13.5	8.1	1,410	22.1	22.2	< 0.4	0.8	
Oct-10-2014	12.7	7.5	1,490	19.9	17.7	< 0.4	0.8	
Oct-17-2014		7.4	1,680	19.7	24.2	< 0.4	0.9	
Oct-24-2014	9.6	7.1	1,890	15.9	27.2	< 0.4	1.0	
Oct-31-2014	9.5	7.8	1,830	17.4	20.8	< 0.4	1.0	12

Notes:

	Nutrients				
	Nitrates as N (dissolved)	Ammonia as N	Total Kjeldahl Nitrogen	Total phosphorous	Ortho-phosphate as P
	USBR	USBR	USBR	USBR	USBR
	mg/L	mg/L	mg/L	mg/L	mg/L
Jan-09-2014	<10	0.3	0.8	0.095 L,V	0.05 T
Feb-27-2014	1.3 T	0.3 L	1.0	0.320 T	<0.01
Mar-26-2014	0.8	0.1	1.0	0.290 T	0.06
Apr-25-2014					
May-08-2014	0.5	0.1	0.7	0.21 T	0.07
Jun-26-2014	0.5	< 0.5	0.5	0.26	0.09
Jul-31-2014	0.5	0.1 V	1.3	0.22	0.06
Aug-01-2014					
Sep-04-2015	0.1	0.1	0.9	0.28 T	0.05 T
Oct-31-2014	1.2	<0.5	0.7	0.44	<1.00

Notes:

Results of the Interim Monitoring Program Oct 2013 - Feb 2014

	General Minerals						
	Calcium	Magnesium	Potassium	Sodium	Chloride (dissolved)	Sulfate (dissolved)	Total Organic Carbon
	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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
	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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
Aug-04-2014	<20			
Aug-11-2014	<20			
Aug-18-2014	<20			
Aug-25-2014	<20			
Sep-01-2014	<20			
Sep-08-2014	<20			
Sep-15-2014	<20			
Sep-22-2014	80	457	23.5	<0.4
Sep-29-2014	122	688	21.8	0.6
Oct-06-2014				
Oct-13-2014	196	681	21.1	<0.4
Oct-20-2014	137	754	20.4	0.5
Oct-27-2014	45	870	17.2	0.9

Notes:
Samples only collected when flow is passing site. Flow of less than 20 cfs does not reach Site C.
August and September: 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
Aug-04-2014	<20			
Aug-11-2014	<20			
Aug-18-2014	<20			
Aug-25-2014	<20			
Sep-01-2014	<20			
Sep-08-2014	<20			
Sep-15-2014	<20			
Sep-22-2014	80	465	23.5	<0.4
Sep-29-2014	122	696	21.8	0.6
Oct-06-2014				
Oct-13-2014	196	695	21.1	0
Oct-20-2014	136	780	20.4	<0.4
Oct-27-2014	45	845	17.2	0.4

Notes:
Samples only collected when flow is passing site. Flow of less than 20 cfs does not reach Site C.
August and September: 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
Oct-01-2014	22	20.3	2,070
Oct-02-2014	22	20.5	2,200
Oct-03-2014	23	21.5	2,340
Oct-04-2014	23	21.7	2,260
Oct-05-2014	23	21.7	2,270
Oct-06-2014	23	22.0	2,220
Oct-07-2014	22	21.8	2,160
Oct-08-2014	21	21.5	2,110
Oct-09-2014	23	21.2	2,160
Oct-10-2014	23	20.7	2,240
Oct-11-2014	25	20.7	2,300
Oct-12-2014	29	19.6	2,390
Oct-13-2014	32	19.5	2,400
Oct-14-2014	33	20.1	2,430
Oct-15-2014	34	19.7	2,250
Oct-16-2014	37	19.4	2,120
Oct-17-2014	40	18.9	1,950
Oct-18-2014	45	19.1	1,820
Oct-19-2014	49	19.5	1,760
Oct-20-2014	49	19.7	1,770
Oct-21-2014	48	18.0	1,810
Oct-22-2014	61	17.3	1,820
Oct-23-2014	83	18.1	1,860
Oct-24-2014	91	18.5	1,930
Oct-25-2014	93	18.0	2,070
Oct-26-2014	116	16.9	2,450
Oct-27-2014	128	15.8	2,300
Oct-28-2014	112	15.9	1,610
Oct-29-2014	97	16.5	1,400
Oct-30-2014	78	16.8	1,690
Oct-31-2014	88	16.8	2,100

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	3,200
July	1,570	27	2,390
August	1,530	26	1,940
September	1,580	24	1,800
October	3,160	19	2,070
November			
December			

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

	Physicals					Total Selenium	Total Boron	Total Molybdenum
PARAMETER	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	ug/L	mg/L	ug/L
Aug-07-2014								
Aug-15-2014	10.3	8.4	2,400	26.7	17.2	0.5	1.2	
Aug-22-2014	8.2	8.3	1,380	27.4	NA	< 0.4	0.6	
Sep-04-2014	9.5	8.2	1,280	25.8	25.3	< 0.4	0.5	7
Sep-19-2014								
Sep-26-2014								
Oct-03-2014								
Oct-10-2014	17.9	8.1	240	23.8	14.1	< 0.4	1.0	
Oct-17-2014		8.1	1,830	20.8	29.9	< 0.4	0.6	
Oct-24-2014								
Oct-31-2014	10.1	8.0	2,430	16.9	10.8	< 0.4	1.7	13

Notes:

	Nutrients				
	Nitrates as N (Dissolved)	Total ammonia	Total Kjeldahl Nitrogen	Total phosphorous	Ortho-phosphate as P
	USBR	USBR	USBR	USBR	USBR
	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
Aug-01-2014					
Sep-04-2015	<0.01	0.08	0.78	0.17 T	0.052 T
Oct-31-2014	<0.40	<0.50	0.55	0.49	<1.00

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
	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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 ginerals 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
	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR	USBR
	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 (Station G)

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Oct-01-2014	22	20.4	2,070
Oct-02-2014	23	20.3	2,230
Oct-03-2014	23	21.1	2,080
Oct-04-2014	23	21.4	2,140
Oct-05-2014	22	21.5	2,160
Oct-06-2014	22	21.9	2,100
Oct-07-2014	22	22.0	1,990
Oct-08-2014	22	21.5	2,010
Oct-09-2014	22	21.1	2,130
Oct-10-2014	22	20.7	2,130
Oct-11-2014	25	20.9	2,390
Oct-12-2014	28	20.2	2,390
Oct-13-2014	29	19.9	2,430
Oct-14-2014	31	20.4	2,190
Oct-15-2014	34	20.0	2,000
Oct-16-2014	35	19.5	1,810
Oct-17-2014	38	19.2	1,650
Oct-18-2014	39	19.3	1,580
Oct-19-2014	39	19.6	1,480
Oct-20-2014	37	19.8	1,500
Oct-21-2014	38	18.4	1,510
Oct-22-2014	36	17.4	1,560
Oct-23-2014	35	18.1	1,640
Oct-24-2014	32	18.5	1,780
Oct-25-2014	27	17.9	2,220
Oct-26-2014	32	16.9	1,990
Oct-27-2014	35	15.7	1,820
Oct-28-2014	36	15.6	1,770
Oct-29-2014	34	16.3	1,900
Oct-30-2014	33	16.4	2,080
Oct-31-2014	31	16.6	2,100

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	2,020	26	1,220
September	1,810	24	1,670
October	1,840	19	1,960
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
Oct-01-2014	95	20.8	1,390	< 0.4
Oct-02-2014	105	20.5	1,370	< 0.4
Oct-03-2014	93	21.5	1,320	< 0.4
Oct-04-2014	98	21.8	1,450	< 0.4
Oct-05-2014	114	21.9	1,490	< 0.4
Oct-06-2014	112	22.0	1,320	< 0.4
Oct-07-2014	110	21.6	1,250	< 0.4
Oct-08-2014	111	21.3	1,260	< 0.4
Oct-09-2014	132	20.8	1,240	< 0.4
Oct-10-2014	135	20.4	1,170	< 0.4
Oct-11-2014	117	20.7	1,150	< 0.4
Oct-12-2014	101	20.0	1,180	< 0.4
Oct-13-2014	103	19.5	1,260	< 0.4
Oct-14-2014	108	20.1	1,380	< 0.4
Oct-15-2014	108	20.0	1,460	< 0.4
Oct-16-2014	110	19.4	1,520	< 0.4
Oct-17-2014	118	19.1	1,550	< 0.4
Oct-18-2014	122	19.1	1,520	< 0.4
Oct-19-2014	127	19.4	1,490	0.4
Oct-20-2014	138	19.6	1,390	< 0.4
Oct-21-2014	142	18.3	1,250	< 0.4
Oct-22-2014	148	17.3	1,210	< 0.4 T
Oct-23-2014	184	18.0	1,180	< 0.4
Oct-24-2014	233	18.3	1,050	< 0.4
Oct-25-2014	276	18.3	940	< 0.4
Oct-26-2014	351	17.4	820	< 0.4
Oct-27-2014	524	16.7	690	< 0.4
Oct-28-2014	711	16.6	560	< 0.4
Oct-29-2014	850	16.8	470	< 0.4
Oct-30-2014	877	17.1	430	< 0.4
Oct-31-2014	799	17.2	400	< 0.4

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	4,080	25	1,500	0.6
September	5,560	24	1,320	0.5
October	14,580	19	1,170	0.4
November				
December				

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

	Physicals					Selenium	Boron	Molybdenum
PARAMETER	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
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
Aug-07-2014	7.1	7.7	1,700	25.8	21.7	0.6	0.9	
Sep-04-2014	9.4	7.8	1,310	24.4	15.4	< 0.4	0.5	5.6
Sep-19-2014	10.1	7.9	1,870	27.1	9.7	< 0.4	0.5	
Sep-26-2014	11.4	7.8	1,090	23.0	10.5	< 0.4	0.4	
Oct-03-2014	12.2	7.8	1,360	20.7		< 0.4	0.5	
Oct-10-2014	13.7	7.8	1,110	21.7	17.6	< 0.4	0.4	
Oct-17-2014		8.0	1,540	19.4	13.5	< 0.4	0.5	

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	5*	95	98	88*	100	93
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	0.01*	0.65	0.58	0.63	0.61	0.58
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	0*	100	100	100	100	100
Nov-2014						
Mar-2015						
Jun-2015						
Sep-2015						
Mar-2016						

Evaluation of the Toxicity of Grasslands Bypass Project Ambient Water Samples for the samples that were collected in September 2014.

Chronic Toxicity of Grasslands Bypass Project Ambient Water to *Selenastrum capricornutum*

There were significant reductions in algal growth in the Site B sample. However, it is important to note that there was also a significant reduction in algal growth in the conductivity control, which suggests that the elevated conductivity (ranging between 13,000-14,000 µS/cm) alone can cause a reduction in algal growth. There were no significant reductions in algal growth in any of the other Grasslands Bypass Project ambient water samples.

Chronic Toxicity of Grasslands Bypass Project Ambient Water to *Daphnia magna*

There was a significant reduction in D. magna survival and reproduction in the Site B sample. However, it is important to note that there were also significant reductions in survival and reproduction in the conductivity control, which suggests that the elevated conductivity (ranging between 13,000-14,000 µS/cm) alone can cause a reduction in D. magna survival and reproduction. There were no significant reductions in survival or reproduction in any of the other Grasslands Bypass Project ambient water samples.

Chronic Toxicity of Grasslands Bypass Project Ambient Water to Fathead Minnows

There were significant reductions in fathead minnow survival in the Site B and F samples. There was a significant reduction in growth in the site B sample. There were no significant reductions in survival or growth in any of the other Grasslands Bypass Project ambient water samples.

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	0*	17.9	16.6	23.2	21.3	16.1
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		5.5	4.8	6.0	4.9	2.8
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	11	< 0.4	< 0.4
15-Sep-14	8	< 0.4	< 0.8	< 0.4	< 0.4
17-Sep-14	8	< 0.4	< 0.8	< 0.4	< 0.4
19-Sep-14	10	< 0.4	< 0.8	< 0.4	< 0.4
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
15-Sep-14	57 T	8.3 T	9.5 T	26 T	<0.5 T
17-Sep-14	95 T	<5.0 T	14 T	26 T	<0.5 T
19-Sep-14	36	7.0	6.0	34	<0.5
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 (10^6cell/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 µg/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